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**The management of ambidexterity: an intellectual capital approach**

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# ***The Management of Ambidexterity – An Intellectual Capital Perspective***

***Neil Turner***

**A thesis submitted for the degree of Doctor of  
Philosophy.**

**University of Bath.  
School of Management.  
June 2011**

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Research within this thesis has been peer-reviewed and available in the following papers.

#### ***Conference Papers***

Turner N. and Swart J. (2010) “*The Role of Knowledge Assets in Ambidextrous Project Learning*”, Paper presented to the EURAM Doctoral Colloquium, Rome, Italy and Winner of a ‘Best Paper’ Award.

Turner N., Maylor H. and Swart J. (2011) “*Ambidexterity-as-Practice: Understanding the Role of the Manager in IT-Services Projects*.” Presented at the OLKC 2011 Conference, Hull, UK.

Turner N., Swart J. and Maylor H. (2011) “*Managerial Ambidexterity in IT-Services Projects*.” Paper presented at EURAM 2011, Tallinn, Estonia.

#### ***Journal Papers Under Review***

Turner N. and Swart J. (2011) “*Mechanisms for Managing Ambidexterity: A Review and Research Agenda*.” Revise and Resubmit at the International Journal of Management Reviews.

Turner N. and Lee-Kelley, E. (2011) “*Ambidextrous Managerial Practices: A Longitudinal Case Study*.” Revise and Resubmit at Management Learning.

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### **Abstract**

In this thesis I propose that the literature on ambidexterity does not fully explore the detailed practices by which organisations and managers may achieve both exploitation and exploration. A systematic review identifies that studies have focused principally at the organisation-level, and there is a lack of both empirical and theoretical work at the micro-level of analysis highlighting how ambidexterity may be achieved in practical, complex, working structures. The research addresses these micro-mechanisms in the context of the management of projects, a suitable area in that it can be considered as using defined processes together with the flexibility to overcome particular issues that arise.

The contribution of the thesis is that it presents an insight into the management of ambidexterity in such an environment, and identifies how multiple knowledge resources are utilised, together with the underlying managerial practices. The level of analysis is the project (specifically, IT-services projects in a major multinational organisation), using the manager as the unit of analysis.

The research question is '*How is ambidexterity achieved at the level of the project?*' This is an opportunity to explore a practical as well as a theoretical gap, in an increasingly important area of business operations.

The first stage of the research examines the managerial role in terms of intellectual capital, using a variety of projects. This shows that the sub-components of IC (human, social and organisational/project capital) can each be understood as having co-existing, orthogonal, exploitative and exploratory elements, an important extension of existing theory. The forms of intellectual capital are interwoven not only with each other, but also with the processes of exploitation and exploration, and to conceive of them as separate is an insufficient theorisation. The findings from the qualitative approach are used to investigate the duality of these concepts and bring greater clarity to our understanding of their operationalisation.

This is followed by eight case studies, each using between three and five managerial respondents, together with project data, used to develop a more fine-grained understanding of ambidexterity in a wide range of industrial settings. This shows different managerial configurations (including '*distributed*' and '*point*' ambidexterity – an addition to current theory), together with five key managerial practices to enable project-level ambidexterity, identified in the context of project complexity, critical events and constraints.

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## Glossary of Terms

The following key terminology will be used in this document:

Ambidexterity	Ambidexterity is understood as the ability to both refine existing domain knowledge (exploitation) whilst also creating new knowledge to overcome knowledge deficiencies or absences identified within the execution of the work (exploration).
APM	Association of Project Management
BoK	Body of Knowledge
Distributed Ambidexterity	“The pattern of exploitative and exploratory practices amongst a group of individuals, the sum of which provides exploitation and exploration at the level of the group, organisation, project or work unit.”
EMEA	Europe, Middle-East and Africa
EP(M)O	Enterprise Programme (Management) Office
Exploitation	Refining project knowledge.
Exploration	Generating new project knowledge.
Human Capital	“The knowledge, skills, experience and leadership capability embedded within the individual.”
NPD	New Product Development
OA	Organisational Ambidexterity
Point Ambidexterity	“An individual who is a significant actor in creating group- or project-level ambidexterity, performing or coordinating both exploitative and exploratory activities that are not replicated by other individuals.”
PM	Project Manager
PMBok	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Project Management Office
PPM	Project and Programme Management
Project	“A temporary endeavour undertaken to create a unique product, service or result.” PMI BoK (2008:5)
Project Capital	“Existing organisational knowledge, together with the formal and informal processes and routines that operate within the boundary of the project.”
SME	Subject Matter Expert
Social Capital	“The network of formal and informal relationships to enable knowledge generation and transfer.”
TMT	Top Management Team

## 1. CHAPTER 1 – OVERVIEW AND SUMMARY

This thesis addresses the issue of *ambidexterity* at the level of the project. In the context of the management of projects, the argument is made that execution should not only incorporate previously-developed knowledge, but that practitioners should also consider that the requirement for *in-project* learning is a consequence of the absence of knowledge – a inevitable practical reality since all projects are, to some extent, unique, yet generally follow standardised processes. This is in line with March's (1991) conception of organisational learning in terms of *exploitation* (refining existing knowledge) and *exploration* (developing new solutions). These ideas lead to the consideration of ambidexterity as a suitable area to address in this context, since it encompasses these exploitative and exploratory elements, and this is used as the theoretical underpinning for the investigation. This approach contrasts with the emphasis on 'tools and techniques' that often characterises practitioner literature in the area. It is an economically significant issue to address in terms of the better understanding of project execution performance.

The thesis begins with the subject of organisational learning, then focuses on ambidexterity. From this, the resources used to achieve it are addressed, and this utilises the concepts of intellectual capital. The research focuses on how these knowledge resources operate to enable ambidexterity at the level of the project.

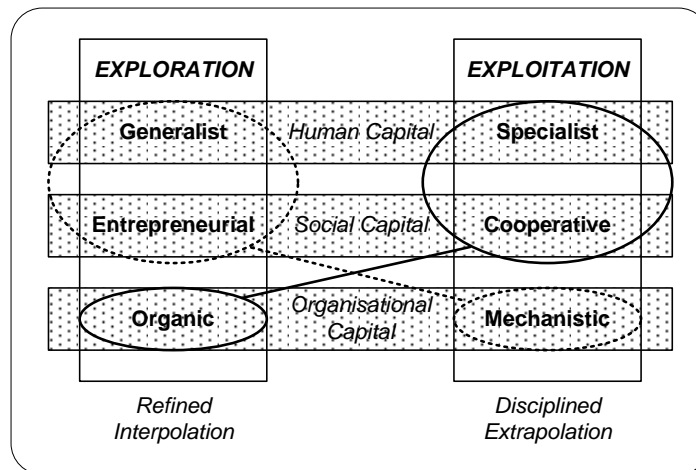
### 1.1 Chapter 2 – Literature Review

In Chapter 2, a systematic review (Tranfield et al., 2003) of the ambidexterity literature shows that the subject has been interpreted in many ways by authors, and there is a lack of definitional clarity. Three major forms of ambidexterity have been identified. In *temporal* ambidexterity (Tushman and O'Reilly, 1996), exploitation and exploration are separated in time, with the organisation moving from one dominant theme to the other. *Structural* ambidexterity (O'Reilly and Tushman, 2004) requires that these modes are separated, with one organisational unit focusing on exploitation, another on exploration, with both integrated at the senior management level to produce an ambidextrous organisation. In this context, management is a focal point for resolving the tension between the two, and these are generally resolved one level down, by creating units with different foci (Raisch and Birkinshaw, 2008). Gibson and Birkinshaw (2004) take a different approach, identifying business-unit level *contextual* ambidexterity using the beneficial choices made by individuals who demonstrate "the behavioural capacity to simultaneously demonstrate alignment and adaptability" (2004:209). The former refers to coherent business activities working towards a common goal, while the latter refers to the capacity to reconfigure those activities as required by the task environment. There is not necessarily a resource trade-off between the two, which can be considered *orthogonal* (perpendicular to each other) dimensions of learning (Cao et al., 2009; Gupta et al., 2006; Raisch et al., 2009). There is, however, a lack of theorisation in more complicated organisational structures, where heterogeneous sub-units (for example, different departments, specialities or domains) interact (Benner and Tushman, 2003) and this is highlighted via the systematic review as an area to investigate further.

I classify the empirical research on ambidexterity performed to date under three broad levels: *organisation*, *group* and *individual*, or a combination of these. These studies are described and categorised. The majority of the work has been at the organisation level, with few examining the detailed managerial role and the social context in which it is performed. Analysis of the empirical research shows that the

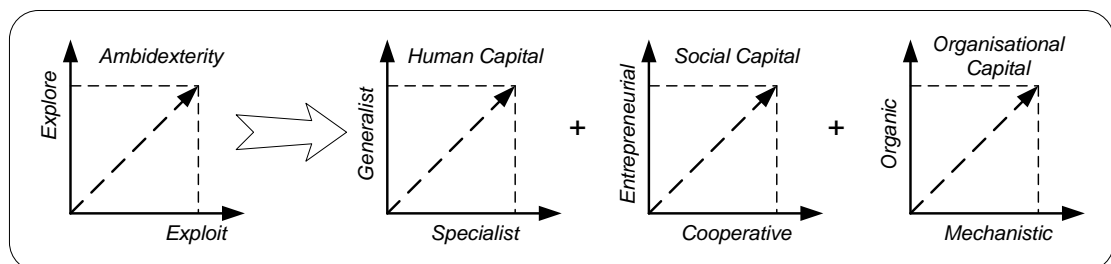
micro-processes enabling ambidexterity are as yet relatively poorly understood, and although the benefits to an organisation of being ambidextrous have been demonstrated (primarily through quantitative methods) the detailed ‘how’ of this achievement is lacking. Additionally, these studies neither explain how such micro-processes enable ambidexterity, nor exactly how the practices underpinning ambidexterity lead to organisational benefit. Because of this, an *input-process-output* approach is proposed. The empirical papers that have followed this approach are documented, and none use the research approach that I subsequently follow. However, they provide a platform on which to build, by addressing the resources and practices used to enable ambidexterity.

The resources considered as inputs in this model are the organisational knowledge assets, specifically in terms of *intellectual capital* (IC). Kang and Snell (2009) propose a framework for *ambidextrous architectures*, whereby human capital (HC), social capital (SC) and organisational capital (OC) can be considered in both exploitative and exploratory forms (i.e. six distinct concepts) and combined to form either a *disciplined extrapolation* or *refined interpolation* model. They therefore offer two separate methods for designing an ambidextrous organisation and this is shown in Figure 1, below.



**Figure 1: Kang and Snell (2009) Model**

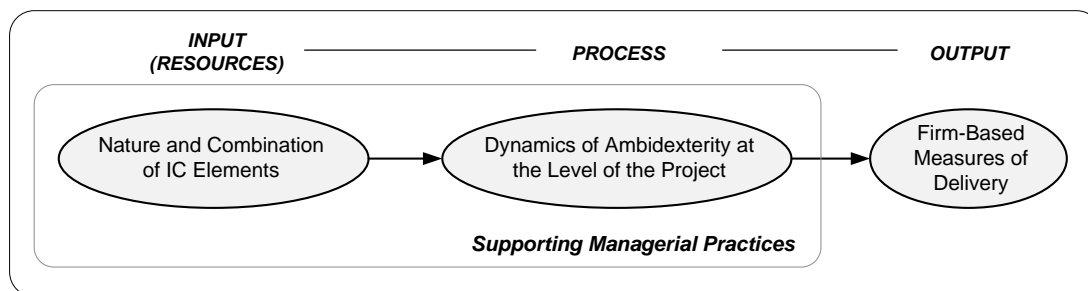
However, I propose an alternative interpretation, in line with the prevailing ambidexterity theory (e.g. Gupta et al., 2006) which contends that ambidexterity can be understood as an orthogonal construct. By considering the sub-components of intellectual capital as orthogonal also, I build on the previous work to propose that within complicated organisational structures (in this work, specifically looking at the role of the manager in the project) *all six* of the Kang and Snell (2009) elements may be beneficial. This is indicated in Figure 2.



**Figure 2: Theoretical Model Based on Kang and Snell (2009)**

This is a new conceptualisation of ambidexterity, and is used as an initial theoretical basis for the research. It is also in line with requests within the literature for further investigation in this area (Simsek et al., 2009). This argument is contextualised with practical examples of how it can be understood in terms of the project management role and the managerial activities.

Other, smaller, formal literature reviews are also included to contextualise the work to the field of project management. From the literature, the research model is built (Figure 3). This looks at the inputs in terms of intellectual capital, the nature of ambidexterity at the level of the project, and the managerial practices by which ambidexterity may be orchestrated. The literature identifies that the link between project-level ambidexterity and performance is poorly understood. Performance measures are subsequently used as sampling criteria for case study selection, and the results of the research provide a basis by which this work can be expanded to establish the effects of the managerial practices identified on project performance.



**Figure 3: Research Model**

The concept of 'project capital' (PC) is developed, to identify the knowledge, routines and processes bounded by the activity within the project, and this is used in place of organisational capital for the research. The level of analysis is identified as the project, and the unit of analysis is the manager.

The literature review and theorisation are used to develop the overall research question, based on the input-process-output model. This is approached from an intellectual capital perspective.

***RQ: 'How is ambidexterity achieved at the level of the project?'***

This is deconstructed into three Sub-Research Questions, linked to the research model:

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

***Sub-RQ3: 'What management practices support the orchestration of ambidexterity?'***

## 1.2 Chapter 3 – Research Design

In Chapter 3, the research philosophy, strategy and design and methods are developed. The epistemological and ontological foundations of the research are discussed, from both the perspective of the management research tradition (Blaikie, 2007), but also with regards to the wider organisational learning literature and the specific discussions occurring within the field of project management. I approach this from a *becoming* ontology and a broadly social constructionist perspective. A qualitative approach is taken, in line with the philosophical position and supported by the literature review which showed that this has not been widely used within the field, especially at the level of individual managers and their practices.

The study organisation is a global IT-services company, delivering projects for a range of large clients in a wide variety of industries, including government, defence, banking, telecoms, manufacturing and healthcare. Although only a single organisation is studied, the work is customer account-based, and the accounts last for years, even decades. Hence using a wide range of long-established contexts can counter the bias of only using one organisation.

The research is described in two phases: the first phase involves interviewing individual managers regarding intellectual capital, and the processes of exploitation and exploration. They were chosen to be those responsible for *managing in projects*, rather than specifically project managers, to gain a wider perspective of the management practices. This is specifically aimed at answering Sub-RQ 1 and 2. A protocol for the semi-structured interviews is developed, examining the intellectual capital elements and the processes of exploitation and exploration. The questions are augmented through a review of previously-used ambidexterity research instruments in order to provide additional traceability to established themes.

The second phase is designed to answer Sub-RQ 3 and uses multiple case studies (Eisenhardt, 1989; Yin, 2009) of projects, looking at the lifecycle of the work. Because of the uncertainty inherent in the work and to gain a richer appreciation of the managerial practices, the critical incident technique (Flanagan, 1954) is chosen to identify practices undertaken under these conditions. Multiple (minimum three) managerial respondents were planned to allow for different perspectives to be understood, and to identify how different managerial roles could together orchestrate project-level ambidexterity. Nominally these roles were the Project Manager, Programme Manager and Project Management Office (PMO) Manager. The case sampling plan uses measures of *project complexity* (higher / lower) (based on Geraldi et al., 2011b) and the *pattern of performance* (smooth / uneven). Due to the difficulty in establishing a definitive measure of project 'success' (covered in the literature review), the pattern of performance measure is used as the output criteria (from the *input-process-output* model) as a method of case sampling, using extensive and objective Company project performance data. This builds on the findings from the first phase.

## 1.3 Chapter 4 – Phase 1 Findings

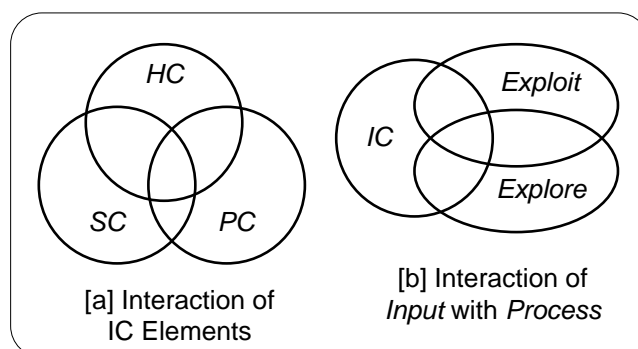
Chapter 4 covers the findings from the Phase 1 interviews to address Sub-RQs 1 and 2. A total of 16 interviews (covering project, programme and PMO manager roles, and the banking, government, defence and commercial industries) were performed with UK-based managers, all but one face-to-face. These lasted for an average of around an hour, and all were recorded and fully transcribed for analysis. The initial coding shows that, in line with Figure 2 above, human, social and



organisational / project capital can indeed be understood in both exploitative and exploratory forms using the manager as the unit of analysis.

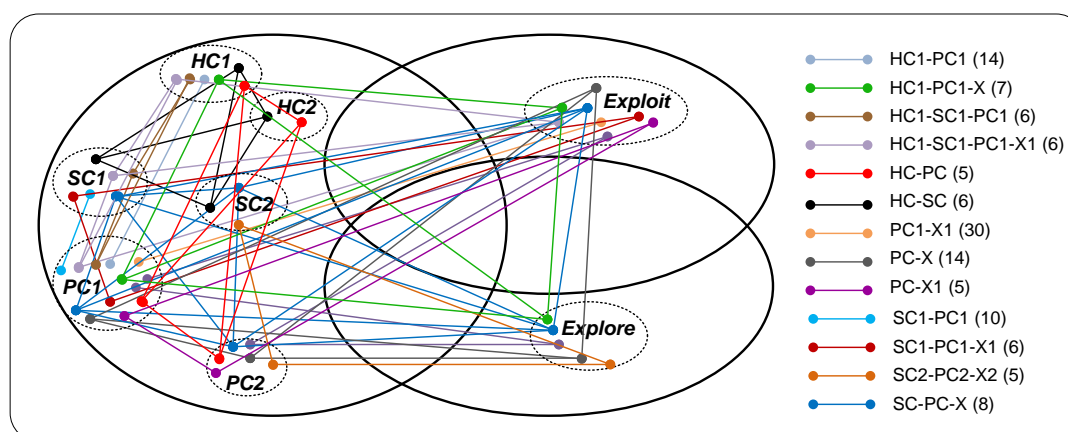
The exploitation and exploration aspects are found to be more challenging, since although the ‘end-points’ of these terms are well-founded (i.e. systematic incremental improvements / innovative new solutions), coding the qualitative interview data was more difficult as there is conceptual and definitional ambiguity at the ‘low levels’ of these processes. Analysis supported the ideas of Farjoun (2010) in that these are a *duality* rather than a *dualism*, and I argue that in the project context they are interwoven over the duration of the work.

A second round of coding is undertaken to identify the interactions between the IC inputs and also the processes of exploitation and exploration, to better answer the Sub-RQs. ‘Parallel-coding’ (King, 2004; Miles and Huberman, 1994:66) is used to identify the co-occurrence of coding elements. From this, multiple, intricately interwoven, interactions are identified, highlighting the complicated nature of managing ambidexterity in terms of resource utilisation. This provides a different approach to the subject, since the literature to date has conceptualised ambidexterity primarily at the group or firm-level where the human, social and organisational capital can be understood as (broadly) separate, although co-existing, constructs (e.g. Kang and Snell, 2009; Subramaniam and Youndt, 2005). Whilst interrelationships have previously been investigated (Reed et al., 2006) their interaction at the individual level is not a well-understood phenomenon. Assessing at the level of the individual manager together with the processes of exploitation and exploration shows that the consideration of the constructs as separate, as was the case with the research model development, does not account for the rich interaction in practice. This is indicated in Figure 4, where [a] highlights the interaction of the input elements and [b] shows the interaction of *input* with *process*.



**Figure 4: Interaction of Research Model Constructs**

This is intended as a simple pictorial representation of the interactions that were demonstrated through the interview evidence, and a detailed mapping of the key coding results and their derivation is demonstrated. This is illustrated in Figure 5, showing the major interactions that were identified in terms of exploitative and exploratory human capital (HC1 and HC2 respectively), social and project capital (coded similarly) along with exploitation and exploration. This highlights the complicated nature of the interactions and the richness that could be derived from the qualitative nature of the research.



**Figure 5: Mapping the Coding Results**

This first phase of research therefore reveals that the elements of IC are significantly intertwined with both each other and the processes of exploitation and exploration. These issues and mechanisms are unpacked, and used in the subsequent Phase 2 case studies further investigating how they can be used to orchestrate ambidexterity at the level of the project.

#### 1.4 Chapter 5 – Phase 2 Findings

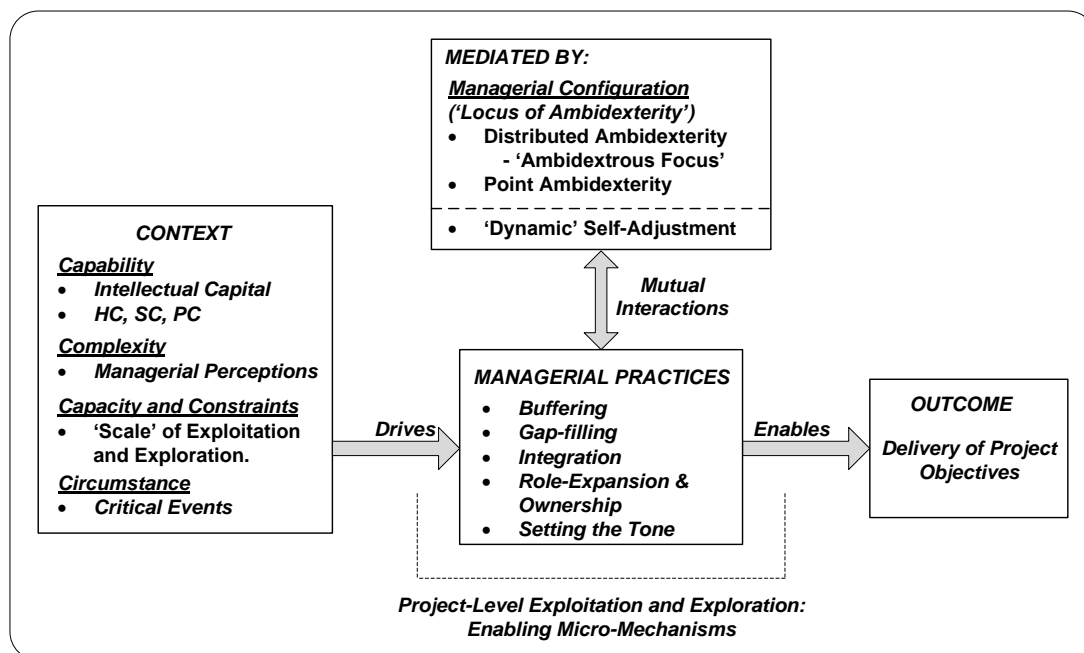
The second phase of the research investigates Sub-RQ 3, based on the Phase 1 results. Eight case study projects are selected, using Company data on complexity factors and performance measures. The cases cover finance, telecoms, government services, defence and healthcare, and evidence is obtained from project data and between three and five managerial interviews per case (on average each around an hour in duration). Again, all interviews were recorded and fully transcribed.

The interview protocol involves the ‘story’ of the project from beginning to end, examining the role of the manager and any critical incidents. The areas under investigation are again the elements of intellectual capital (HC, SC, PC), exploitation and exploration, and project delivery performance. The initial a priori coding structure is developed from the Phase 1 interview data together with extant literature. Each case was written up and, from these, summaries of each respondent were created to capture their intellectual capital inputs, the main processes of exploitation and exploration, and their delivery focus. From this analysis and the memos written as part of it (Corbin and Strauss, 2008:117-141; Miles and Huberman, 1994:72-5) numerous ‘meta-codes’ are identified, and these are used as the basis for second-cycle pattern-coding (Miles and Huberman, 1994:69). These cover the areas of *managerial configuration* and specific *practices*, together with the idea that exploitative and exploratory responses are subject to *constraints* by issues such as staffing levels, process requirements, budgets, timescale, and customer demands. These ideas are identified ‘top-down’ from the case analysis, with ‘bottom-up’ supporting interview evidence presented.

Two specific managerial configurations are identified. Firstly, *distributed ambidexterity*, understood as ‘the pattern of exploitative and exploratory practices amongst a group of individuals, the sum of which provides exploitation and exploration at the level of the group, organisation, project or work unit.’ Secondly, *point ambidexterity*, ‘an individual who is a significant actor in creating group- or project-level ambidexterity, performing or coordinating both exploitative and exploratory activities that are not replicated by other individuals.’ These are

explained in terms of examples from the case data and analysis of the managerial roles. This also indicates the ability of managers to '*self-adjust*', in that individuals undertake activities consistent not only with their personal ability and responsibility, but also in accordance with the other individuals on the project. Managerial practices are therefore not just a function of the IC that he/she brings to the project, and their role, but are mediated by an understanding of the responsibilities and skills of others.

Five managerial practices are also identified to support project-level ambidexterity. This is understood as both knowledge refinement and knowledge creation in order to meet the project objectives. The practices are '*buffering*', '*gap-filling*', '*integration*', '*role-expansion*' and '*setting the tone*'. These are discussed at length in the chapter, and brought together in the model of Figure 6 to highlight the enabling micro-mechanisms of ambidexterity, showing the '*how*' from the primary RQ.



**Figure 6: Enabling Project Exploitation and Exploration**

As with the Phase 1 research, more insight is generated from the data by second-cycle coding analysis. The 'meta-codes' of configuration and the five managerial practices are parallel-coded with the context elements of IC, forms of complexity, constraints and critical incidents to identify links between the drivers and the practices. Each of the new codes is analysed and the data is shown in the chapter. Again, these are found to be highly complicated interactions, including many inter-linkages between the practices and configuration elements. Distributed ambidexterity can co-exist with point ambidexterity, and multiple combinations of practices are found, showing that each can be identified both separately and in combination with others. This further indicates the complicated nature of the micro-mechanisms of ambidexterity. The qualitative nature of the work allows a more fine-grained investigation and enables the details to be unpacked effectively. The findings indicate that to understand the orchestration of ambidexterity at the project level, a holistic approach is required, as to take a reductionist approach may miss the multiple interactions that underpin the effectiveness of the practices.

## **1.5 Chapter 6 – Summary, Discussion and Conclusions**

This chapter summarises the work and relates the findings back to the original literature issues that were identified. These include the understanding of ambidexterity in a complicated organisational structure, the orthogonal nature of intellectual capital under these conditions, and the managerial practices and micro-mechanisms that influence ambidexterity at the level of the project. The findings are discussed in light of the original I-P-O literature, and the results used to answer specific questions raised by previous authors regarding further work they recommend.

The limitations of the study, areas for future work and the contribution to knowledge are addressed, together with the implications for practice.

## 2. CHAPTER 2 - INTRODUCTION AND LITERATURE

### 2.1 Projects and Learning

This thesis addresses the issue of *ambidexterity* at the level of the project. Why is this important? Projects are economically significant units of activity, yet their success rates are often poor. This makes them a context worthy for study. Much project management practitioner literature is relatively prescriptive and ‘tool-based’ in nature and, although highly valuable, this is often in contrast to the lived reality of project managers (including myself), for whom the necessity for flexibility and adaptability to deal with real issues is readily apparent. In simple terms, managers must both apply the tools and techniques of the profession appropriately, yet also ensure that new knowledge is created to overcome project-specific issues. The practical business problem to address is therefore that whilst it is beneficial to improve project processes and learn from previous work, in reality this is insufficient to deliver projects.

The lived experience is therefore out of sync with prevailing approaches in the PM field. This offers a significant research opportunity to understand how managerial practices can enable this *knowledge generation* as well as the necessary *knowledge refinement*. Love et al. (2005b) identify that examples of project-based ‘learning organisations’ are low, and this is both an academic as well as a practical problem.

March (1991) considers these concepts in terms of *exploration* and *exploitation*. “Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution.” (March, 1991:71). It should be noted, though, that multiple interpretations of this terminology have been used within the literature (Lavie et al., 2010), and exploitation and exploration are consequently ‘umbrella’ constructs (Suddaby, 2010). There is a growing body of scholarly work which focuses on *ambidexterity* as a concept by which to consider the need to balance the requirements of exploitation and exploration, yet, as will be shown, there is limited research at the micro-level to understand how this occurs or how it is managed in practice.

The next section presents a systematic literature review of this subject and its location within the broader OL field. The literature of ambidexterity is examined first, to identify the theoretical and empirical work to date, and the subsequent area in which to make a contribution. Key recommendations for future work from existing papers are identified as areas to address. Then the pertinent literature of project management is brought in as the context for the research.

### 2.2 OL Literature Overview

There is considerable scholarly literature on organisational learning and knowledge, and an initial overview of the key themes is given in Figure 7. The imperative to become a learning organisation (Prahalad and Hamel, 1990) has been stressed for many years (Argyris, 1977; Argyris, 1993; Cangelosi and Dill, 1965; De Geus, 1988; Fiol and Lyles, 1985; Garvin, 1993; Senge, 1990; Stata, 1989; Sugarman, 2001). However, despite the rapid growth in the popularity of ‘organisational learning’ as a subject (Bapuji and Crossan, 2004), there has been little agreement amongst scholars on the definition of terms or mechanisms (Crossan et al., 1999; Friedman et al., 2005; Huber, 1991), and several philosophical perspectives have been taken

by researchers (Crossan et al., 1999; Easterby-Smith, 1997). There has been much debate over the nature of organisational learning, what it is, what it means, and where it is situated (Crossan et al., 1999; Easterby-Smith et al., 2000), and the relationship between individual and organisational learning (Antonacopoulou, 2006). For reviews of the literature, see, for example, Bapuji and Crossan (2004); Easterby-Smith (1997); Easterby-Smith and Lyles (2003); Easterby-Smith et al. (2000); Gherardi and Nicolini, (2001); Shipton (2006); Taylor et al. (2010).

In drawing on the organisational learning literature, the *cognitive* school (Huber, 1991; Hedberg, 1981; Kim, 1993; Shrivastava, 1983; Watkins and Golembiewski, 1995) argues that learning does not in itself necessarily imply action or execution. The intention of this thesis is to highlight the active aspects that may be of benefit to practicing managers, more in line with the *behavioural* school (Chakravarthy, 1982; Cyert and March, 1963; Levitt and March, 1988; Nelson and Winter, 1982).

The literature on organisational knowledge is again voluminous, and has limited direct overlap with that of organisational learning. However, although the perspective taken is different, much of the discussion has significant parallels with OL (Vera and Crossan, 2003). These linkages are explored in Figure 7, in order to understand how the two domains may be of benefit in exploring the PM context. Some scholars argue for organisational knowledge as a theory of the firm (Grant, 1996; Harris, 2001; Liebeskind, 1996; Spender, 1996), in line with the resource-based view of the firm. Indeed Drucker (1988) characterised knowledge-based organisations as more akin to a symphony orchestra than a factory, and argued that “knowledge is *the* primary resource for individuals and for the economy overall” (Drucker, 1992:95). In the context of organisational operations, this necessitates drawing on existing organisational knowledge. If exploitative and exploratory learning involves the refinement of existing knowledge and the search for new knowledge respectively, then we must look to existing knowledge stocks (Bontis et al., 2002; Crossan et al., 1999; Dierickx and Cool, 1989; Starbuck, 1992) as the basis for that learning (Kang and Snell, 2009; Nonaka, 1994).

Other peripheral, though associated, literature is highlighted in Figure 7, namely that of dynamic capabilities and absorptive capacity. The former is defined by Teece et al. (1997:515) as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.” However, there is much debate over the exact definition and nature of these capabilities and their relation to learning (Ambrosini and Bowman, 2009; Easterby-Smith and Prieto, 2008; Easterby-Smith et al., 2009; Eisenhardt and Martin, 2000; Lei et al., 1996; Teece and Pisano, 1994; Wang and Ahmed, 2007; Winter, 2003; Zollo and Winter, 2003). This is potentially broadly applicable to the analysis of learning within complex organisational forms, where uncertainty is inherent and must be resolved as part of the work. Similarly, ‘absorptive capacity’ (Cohen and Levinthal, 1990) describes how a firm’s ability to assimilate new knowledge is related to the knowledge it currently has (Easterby-Smith et al., 2009; Easterby-Smith et al., 2008b; Lane et al., 2006; Zahra and George, 2002), and this also aligns with Ritter and Gemunden’s (2003) concept of ‘network competence’ when studying networked projects and programmes.

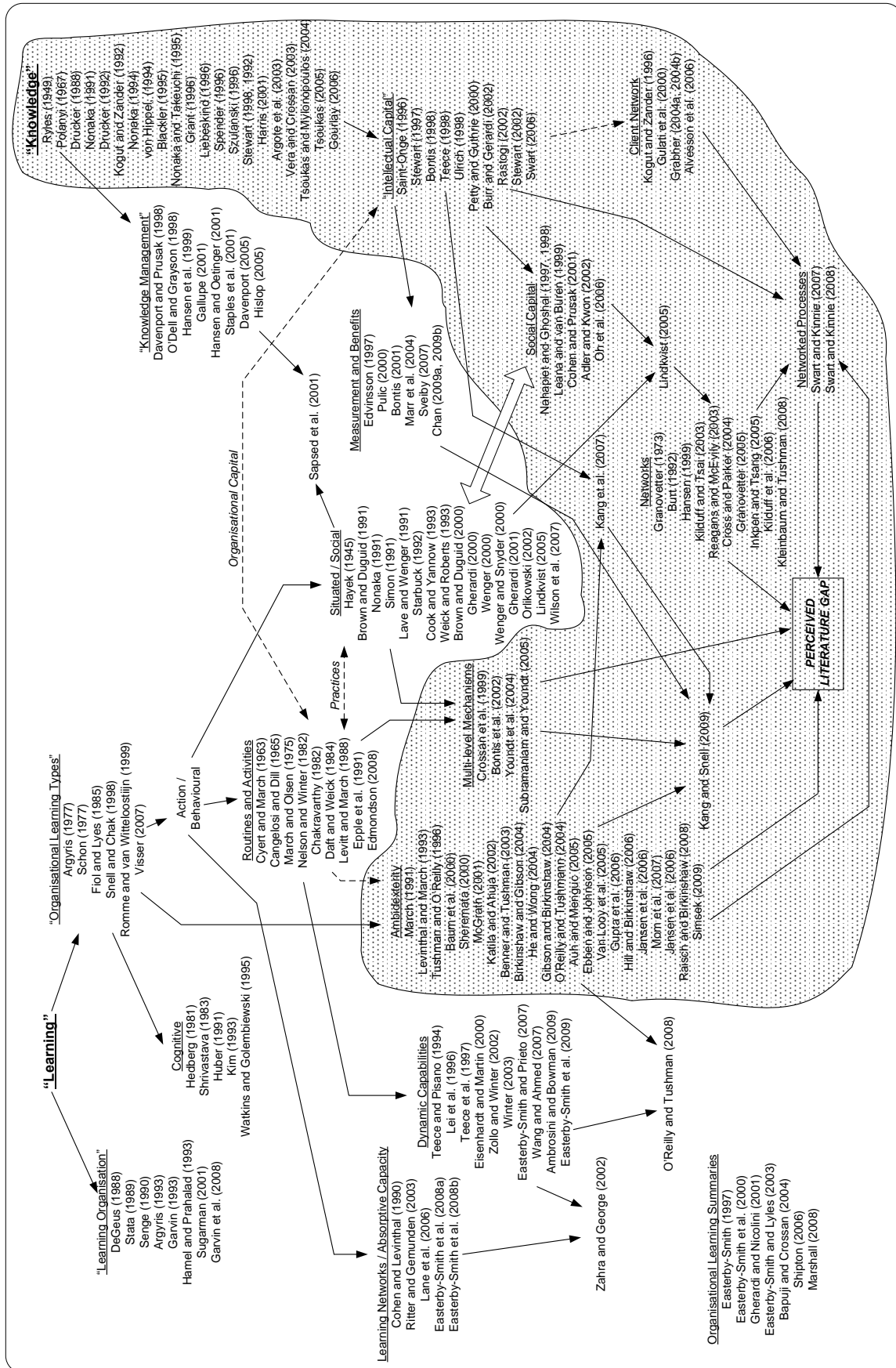


Figure 7: Literature Map

Within Figure 7, the shaded areas are those which will be shown to be central to this work, specifically those of *ambidexterity* and *intellectual capital*. Other areas are covered so as to give a general framework of existing work so that the studies of ambidexterity can be framed within a broader context.

Following the seminal explore/exploit distinction by March (1991), there has been significant scholarly interest in mechanisms for managing these learning forms and achieving both effectively. However, Duncan (1976) was the first to refer to the term *ambidexterity*, earlier. He argued that “the organization has to be strategically responsive in making major changes while at the same time it must be concerned with carrying out its activities in the most efficient manner” (Duncan, 1976:172). As March (1991) identified, short-term benefit may be obtained by exploitation, whereas longer-term benefit is obtained by exploration, although this is more uncertain than refining existing knowledge to achieve more immediate improvements.

Expanding March’s (1991) work, Levinthal and March (1993:105) draw attention to the “failure trap” of excessive focus on exploration, whereby an organisation constantly seeks new ideas. Similarly, the “success trap” (1993:106) is when an organisation continues with its exploitative learning, generally accompanied by strong short-term returns, yet subsequently fails to adapt to the requirements of the market. Leonard-Barton (1992) refers to this as ‘core rigidity’, and Holmqvist (2009) reviews how either exploration or exploitation tends to drive out the other, making it difficult for organisations to achieve both. Eisenhardt et al. (2010) also report on the tendency for organisations to become more structured as they age and grow, and aim for more efficiency (i.e. an emphasis on exploitation). Hence, the argument put forward by Levinthal and March (1993:105) is that “[t]he basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability”. The requirement is for the firm to simultaneously exploit current competencies and resources to secure efficiency benefits, whilst also creating variation through exploratory innovation to generate future returns (Benner and Tushman, 2003). This can, however, be influenced by the mood of the time (e.g. Kanter, 2010), yet the need to practically balance operational excellence with continuous innovation is becoming increasingly important for firms in all markets (Magnusson and Martini, 2008).

Adler et al. (2009) discuss this in terms of operations management, arguing that mature processes provide few natural opportunities for learning, and that to perform ambidextrously, organisations must reconcile the inherent tensions. In highlighting the effectiveness of Toyota, they explain that “[i]t operates on the premise that every original plan for a project is imperfect and incomplete” (Adler et al., 2009:106), thereby culturally accommodating flexibility. The Toyota study finds multiple contradictory forces that are inherently managed to generate superior performance.

Ambidexterity is suitable for further investigation, and in order to perform this, a systematic review of the literature (Tranfield et al., 2003) has been undertaken. This has been developed from the field of medicine, and provides a basis for rigorously and systematically examining the existing literature in line with a pre-defined search and evaluation strategy. It should be “systematic, transparent, and reproducible” (Tranfield et al., 2003:209).



## 2.3 Ambidexterity Systematic Review.

The systematic review question was proposed as:

***“What is known about ambidexterity in terms of theoretical conceptualisations, operationalised research and empirical findings?”***

A systematic review protocol was designed to identify previous studies of ambidexterity, the theoretical perspectives developed, research methods employed and empirical evidence produced. This provides a relatively straightforward application of the systematic review procedure. For a full description of the review methodology and criteria, see Appendix A.

### 2.3.1 Strategy and Sources

As a systematic review, this subject is comparatively clear-cut with regard to search strategy. In terms of data location, the search question is limited to academic literature. It was not anticipated that practitioner or generic literature would contribute strongly to this search. However, it was accepted that some practitioner-focused journals (such as Harvard Business Review and California Management Review) are likely to contain useful information.

The primary search databases were *ABI/Inform Proquest* and *EBSCO*, since they contain the major journals in which this subject is discussed. However, books, working papers, conference proceedings and theses were also considered (Mollen, 2007) (see Appendix A).

### 2.3.2 Keywords

When identifying an appropriate area to research, the size of the literature must be broad enough to cover sufficient detail, but also of a manageable scope such that a review is practical. The following example searches in EBSCO were performed using scholarly, peer-reviewed, journals, with data taken between June 2009 and May 2011.

Certain keyword searches were identified as being too unwieldy. For example, using the search string “project\* AND learn\*”, 4540 results were returned, and removing the ‘scholarly’ filter increased this to 8649 results (data from May 2011).

Note that the “\*” option was used to include learn(ing), explore/exploratory, exploit/exploitative, ambidextrous/ambidexterity and so forth, to include multiple terms in the search. Five key strings are shown below (data from May 2011, note that HBR is not recognised as peer-reviewed literature in EBSCO).

- [1] ‘exploit\* AND explor\*’ - 1613 results
- [2] ‘ambidex\*’ – 115 results
- [3] ‘exploit\* AND explor\* AND learn\*’ – 262 results
- [4] ‘ambidex\*’ OR ‘exploit\* AND explor\* AND learn\*’ – 365 results
- [5] ‘ambidex\*’ OR ‘exploit\* AND explor\* AND learn\*’ NOT ‘hand\*’ – 348 results

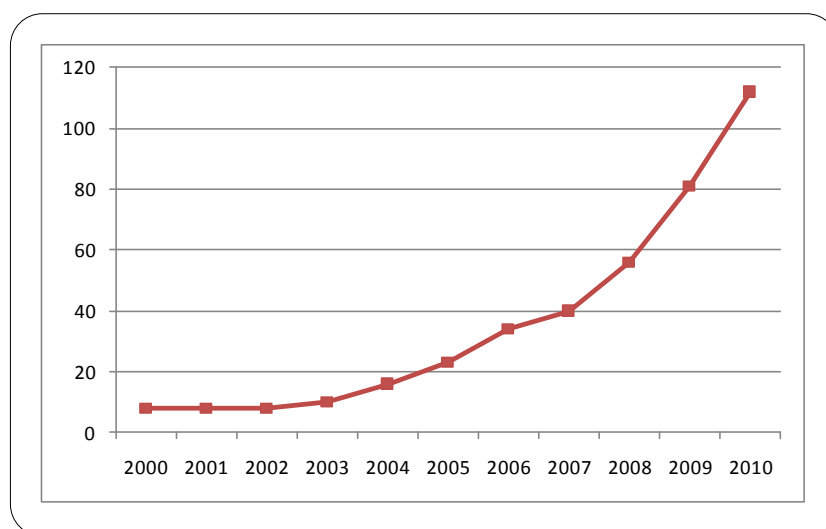
String [1] is too extensive and not realisable, whereas string [2] appears far more manageable. However, there is a risk that key literature may be missed if the terminology of March (1991) is preferred by the writer. Option [3] attempts to

overcome this by using different language, and these are combined in [4]. There is some overlap between [2] and [3], given the results of [4].

One possible consideration is that the use of the word *ambidextrous* may find papers utilising the term in its more commonly-used form. Search string [5] was designed to eliminate terms such as *left-handed*, although the reduction in results is small. In case option [5] takes out valuable research that, for example, references the alternative terminology before bringing in the managerial application. Search strings [2] and [3] were the primary candidates to pursue, and string [2] was addressed initially.

Figure A1 in Appendix A shows how these literature elements have grown in significance since 2000, and Figure 8 (below) highlights the use of the term ‘ambidex\*’ in scholarly literature. This is an emerging field, with the bulk of the results being published since 2003.

The initial approach was to pursue the ‘ambidex\*’ literature, and having reviewed all the literature in [2], it was apparent that ‘conversations’ were occurring under the ‘ambidexterity’ terminology, and that a paradigm was emerging (Raisch and Birkinshaw, 2008). Consequently the review concentrated on option [2], using cited papers from option [3] where they had significant relevance. It is apparent from Figure A2 in Appendix A that the literature involving *explor\*&exploit\*&learn\** is largely separate from the *ambidex\** work (the difference between the two middle lines), and so this is an appropriate methodology in focusing on a specific area of literature.



**Figure 8: ‘Ambidex\*’ Literature Over Time (EBSCO Data to end of 2010)**

Appendix A shows the detailed procedure used for evaluating the papers identified. Table A1 shows the inclusion / exclusion criteria developed, and the corresponding justifications for each point, and Tables A2 and A3 show the empirical and conceptual paper evaluation criteria. The Quality Assessment Tool is given in Table A4, showing how each paper is evaluated, with the corresponding Relevance Assessment Tool in A5. The Data Extraction Format is given in A6, in order to show how the analysis data was captured. The purpose of this detail is to provide transparency in the research process, so that the study can be replicated at a future date. It is accepted that not all papers may be found via this means, and that other researchers may take an alternative approach, but the process shows how the work was undertaken, and that it was performed in a systematic manner.

It was intended that the data from the systematic review would be synthesised with a view to contributing to the underlying theoretical position and developing the research method and analysis. Specifically, a meta-analysis of the literature data (Dixon-Woods et al., 2004) was intended to provide a thorough summary of the theoretical positions offered by scholars, and also a review of the empirical methods used in research, to provide sufficient evidence to support the research design. In practice, the underlying theoretical and empirical themes emerged as the literature was reviewed, and these will now be discussed in detail.

## 2.4 Ambidexterity Literature

The use of the word ‘ambidexterity’ in scholarly debate has risen rapidly in recent years (Raisch et al., 2009), as highlighted in Figure 8. Although generically it means the ability to pursue two different paths, a consistent definition is, however, not apparent (Cao et al., 2009; Gupta et al., 2006) and Chermack et al. (2010:149) describe the study as “extensive but unfocused.”

As Simsek (2009) observes, the term is used within multiple areas of research, including strategic management (Jansen et al., 2008; Lubatkin et al., 2006; Voelpel et al., 2006), innovation and technology management (Ambos et al., 2008; He and Wong, 2004; Tushman and O'Reilly, 1996), organisational learning (Levinthal and March, 1993), organisation theory (Benner and Tushman, 2003), operations management (Adler et al., 2009) and organisational behaviour (Gibson and Birkinshaw, 2004). The increasing coverage in both academic and practitioner literature (Birkinshaw and Gibson, 2004; O'Reilly et al., 2009; Tushman and O'Reilly, 1996) and executive briefings (Birkinshaw and Gibson, 2005) indicates the importance of the subject. Indeed, Markides (2007; 2011) even uses the term ‘ambidextrous’ in highlighting how business school staff need to balance both rigour and relevance simultaneously.

Raisch and Birkinshaw (2008) argue that organisational ambidexterity is taking shape as a research paradigm in organisational theory, which they describe as “a theoretical framework of a scientific school or discipline within which theories, generalizations, and the methods to test them are formulated” (2008:396). It should be noted that, despite such attention to the subject, few firms can actually achieve ambidexterity (Sarkees and Hulland, 2009), and hence further research into its nature is important.

Although the focus of this work is broadly on the learning aspect, in reviewing the use of the word ‘ambidexterity’, a beneficial, wider, view is obtained. A summary of some of the varied definitions over time is given in Table 1:

**Table 1: Definitions of Ambidexterity**

Author(s)	Definition
Achrol (1991)	Simultaneous efficiency, innovation and flexibility.
Tushman and O'Reilly (1996)	Able to manage both incremental and revolutionary change
Sheremata (2000)	New product development in terms of centrifugal forces pulling the organisation outward that increase the quantity and quality of ideas, and centripetal forces that pull the organisation inward, integrating dispersed ideas.
Benner and Tushman (2003)	Exploitative and exploratory innovation.

Gibson and Birkinshaw (2004)	'Contextual ambidexterity' as adaptability and alignment.
O'Reilly and Tushman (2004)	Structural ambidexterity, separation between exploratory and exploitative units.
Seely Brown (2004)	Firm must not only look after its core business, but also be cognisant of events at the periphery that may become mainstream.
Graetz and Smith (2005)	Controllability and responsiveness.
Moore (2005)	Complex systems and volume operations.
Ahn et al. (2006)	New product development both in terms of business performance and knowledge performance.
Danneels (2006)	Ambidextrous firms can develop and market both sustaining and disruptive innovations.
Lee et al. (2006)	Balancing flexibility and rigour in global software development,
Vinekar et al. (2006)	Different roles of agile and traditional IT development
Gratton and Erickson (2007)	Leaders need to be task- and relationship-oriented.
Han (2007); Han and Celly (2008)	Strategic ambidexterity as the ability to execute paradoxical strategies of pro-profit and pro-growth.
Lin et al. (2007)	The simultaneous and balanced presence of both existing and new partners in a firm's network of alliances.
Lee and MacMillan (2008)	Deploying both <i>procedural</i> and <i>coordinative</i> knowledge-sharing.
Gulati and Puranam (2009)	Informal organisational operation can complement the formal structure, causing 'compensatory fit'
Sarkees and Hulland (2009)	Innovation and efficiency.
Sethi and Sethi (2009)	Two dimensions of innovativeness in new product development, namely novelty and appropriateness.
Schreyögg and Sydow (2010)	Adaptable fluidity and efficient stability.

Gupta et al. (2006) also show that the definitions used for exploitation and exploration are inconsistent amongst authors, and that some scholars argue for exploitation as the re-use of existing knowledge with no additional learning, whereas innovation and new learning is termed exploration. They argue for March's (1991) terminology, with the two forms representing different learning. This is the dominant view within the literature (see also Baum et al., 2000:768) and is the one I will use within this research.

With regard to the application of ambidexterity, the exploitation and exploration concepts of March (1991) will be used. The conception of organisational ambidexterity will also be in line with Simsek (2009:602), as "an organization-level construct that manifests itself in the organization's exploitative and exploratory attainments." However, I will address this primarily at the micro-level to better explain its foundations.

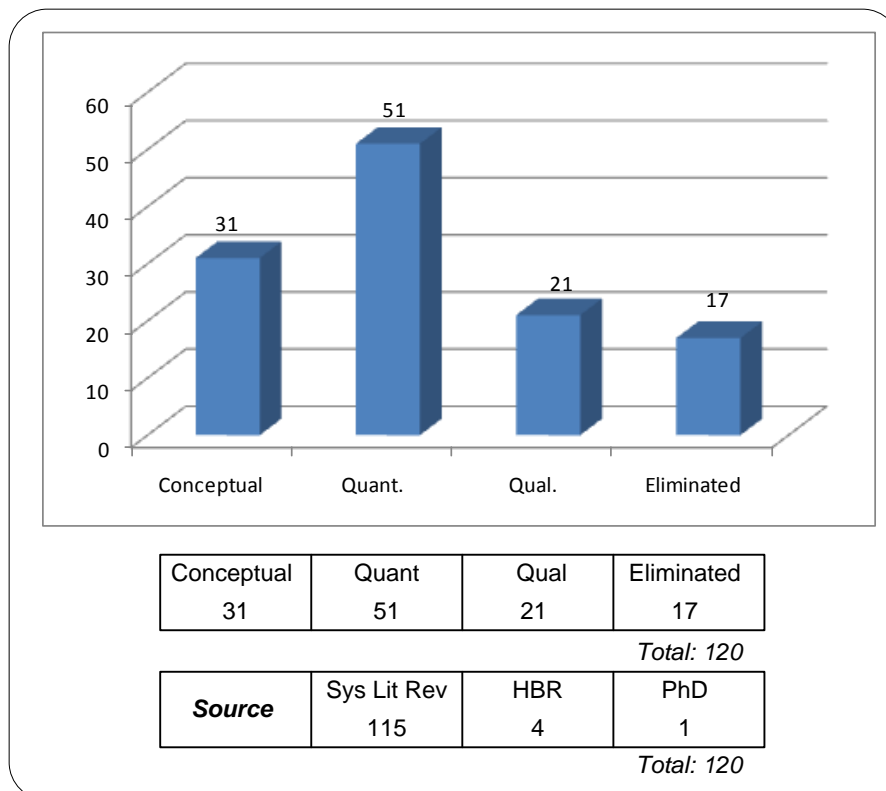
Multiple aspects of 'exploit' and 'explore' are also inherent within the literature (Lavie et al., 2010). Kollmann et al. (2009:304) list a number of these tensions: incremental change / revolutionary change; incremental innovation / radical innovation; existing

business / future (emerging) business; short-run perspective / long-run perspective; selection / variation; operational tasks / strategic tasks; existing technologies / new technologies; certainties / possibilities (opportunities); alignment / adaptability; efficiency / effectiveness; mechanistic structures / organic structures; routine / non-routine; conservatism / entrepreneurship; stability / flexibility; preservation / change; sustaining advantages / creating advantages; convergent behaviour / divergent behaviour; and path dependence / path creation.

The range of meanings precludes a generic definition that usefully encompasses them all, and therefore I return to the 'learning' roots of the subject. I will therefore use the following definition of ambidexterity for the research context:

***Ambidexterity is understood as the ability to both refine existing domain knowledge (exploitation) whilst also creating new knowledge to overcome knowledge deficiencies or absences identified within the execution of the work (exploration).***

In terms of the systematic review methodology, the papers were reviewed, categorised as either conceptual or empirical, qualitative (based on cases and/or interviews) or quantitative (using survey data and subsequent statistical analysis) and rated according to the protocol in Appendix A. Some were eliminated due to irrelevance (including interviews, summaries of other papers and reviews, guides to glove manufacturers in healthcare, etc.) and the results are shown in Figure 9.



**Figure 9: Literature Themes from 'Ambidexterity' Systematic Review**

A summary of the journals in which the included papers were published is given in Table 2, along with the journal rating according to the ABS 2010 rankings. This indicates the significance of the subject, in that it is discussed in highly-rated journals.

**Table 2: Journal Sources of Referenced Papers**

Qty	Journal	Qty	Journal
12	Organization Science (4*)	1	Creativity and Innovation Mgt. (1*)
7	Academy of Mgt. Journal (4*)	1	European Journal of Marketing (3*)
6	Journal of Mgt Studies (4*)	1	European Mgt. Review (1*)
4	Harvard Business Review (4*)	1	Entrepreneurship Theory and Practice (4*)
4	Int. Journal of Tech. Mgt (2*)	1	Human Relations (4*)
3	Int. Journal of Innov. Mgt. (2*)	1	IEEE Trans. Eng. Management (3*)
3	Jour. Prod Innov. Mgt. (4*)	1	Ind. and Corporate Change (3*)
3	Long Range Planning (3*)	1	Industry and Innovation (2*)
3	Management Science (4*)	1	Information Systems Mgt. (2*)
3	MIT Sloan Mgt. Review (3*)	1	Information Sys. Research. (4*)
3	Strategic Mgt. Journal (4*)	1	International Business Review (3*)
2	Adv. in Dev. Human Res. (2*)	1	Int. Journal of HR Dev. & Mgt. (--)
2	California Mgt. Review (3*)	1	Journal of Business Strategy (--)
2	Industrial Marketing Mgt. (3*)	1	Journal of Int. Marketing (3*)
2	Int. Journal of HR Mgt. (3*)	1	Journal of Marketing (4*)
2	Jnl. of Applied Behav. Sci. (1*)	1	Journal of Mgt. Info. Sys. (3*)
2	Journal of Change Mgt. (1*)	1	Journal of Operations Mgt. (4*)
2	Jour. Enterprise Culture (--)	1	Management Decision (1*)
2	Journal of Management (4*)	1	Project Management Journal (2*)
2	Leadership Quarterly (4*)	1	R&D Management (--)
2	Schmalenbach Bus. Review (--)	1	Research Tech Management (--)
2	Strategic Org (2*)	1	Research Policy (4*)
2	Technovation (2*)	1	Strategy and Leadership (--)
1	Academy of Mgt. Perspec. (3*)	1	PhD (unpublished)
1	Business Horizons (1*)		
1	Canadian Jour. Admin. Sci. (2*)		<i>TOTAL: 103</i>
1	Comms. of the ACM (3*)		

A summary of the theoretical issues, and identified gaps, is now given, followed by an analysis of the empirical data. Note that some further papers have also been included in this review beyond those identified by the keyword 'ambidex\*', including those heavily referenced and other papers within special issues.

## 2.5 Conceptualisations of Ambidexterity

As March (1991) identified, short-term benefit may be obtained by exploitation, whereas longer-term benefit is obtained by exploration, although this is more uncertain than refining existing knowledge to achieve more immediate improvements. A key concern in the ambidexterity research is that the measure of success chosen, and the timeframe in which it is taken, is vital in the study (Raisch and Birkinshaw, 2008). Consistent with this argument, Benner and Tushman (2003) argue that a focus on process management (such as TQM, Six-Sigma, BPR, ISO9000) can increase exploitative capability and organisational efficiency in the short term, but can stifle exploratory innovation. Hence, process management improvements are an insufficient basis for long-term competitive advantage. They propose that process improvements are beneficial for incremental innovation and powerful in stable, incremental-innovation environments, but that an ambidextrous organisation is required to support both incremental and radical innovation.

Similarly, Van Looy et al. (2005) also argue that compared to focused organisations, ambidextrous organisations, *ceteris paribus*, tend to be inferior in terms of financial returns, jeopardising their sustainability. Ambidexterity, therefore, is not an intrinsically obvious state for an organisation to attempt to attain. It implies additional resources, as higher levels of managerial and organisational complexity are being introduced (see also Adler et al., 2009). However, using simulations, Van Looy et al. (2005) show that longer timeframes allow portfolio effects to unfold, and financial returns are also increased by the effect of synergies within the firm. Kollmann et al. (2009) additionally discuss ambidexterity in relation to its role in avoiding the emergence of inertia in entrepreneurial growth companies. Schreyögg and Sydow (2010) advocate 'fluidity', but advise that this must be balanced with structure or any learning will be transient and subsequently lost.

To achieve long-run returns, organisational structure can be changed to escape potential competency traps (Siggelkow and Levinthal, 2005), and in a link with the dynamic capabilities literature, Benner and Tushman (2003:242) argue that "[a]n organization's dynamic capabilities depend on simultaneously exploiting current technologies and resources to secure efficiency benefits, and creating variation through exploratory innovation." O'Reilly and Tushman (2008:200) argue that "ambidexterity does not mean random variation or tolerating inefficiency but a deliberate approach to variation-retention-selection that uses existing firm assets and capabilities and reconfigures them to address new opportunities" (see also O'Reilly et al., 2009). However, these concepts require further refinement in order to be meaningfully addressed within organisations.

There is general consensus that achieving both exploitation and exploration is beneficial (Raisch et al., 2009), but there is a lack of consensus over what exactly this means (Cao et al., 2009; Gupta et al., 2006). In terms of the general approach, He and Wong (2004:481) advise "studies have shown that exploration and exploitation require substantially different structures, processes, strategies, capabilities, and cultures to pursue and may have different impacts on firm adaptation and performance. In general, exploration is associated with organic structures, loosely coupled systems, path breaking, improvisation, autonomy and chaos, and emerging markets and technologies. Exploitation is associated with mechanistic structures, tightly coupled systems, path dependence, routinization, control and bureaucracy, and stable markets and technologies."

Sheremata (2000) takes an alternative perspective, and argues that organisations not only have to generate new ideas for creative action, but that these must be harnessed and integrated into collective action. She models these as *centrifugal* forces (decentralisation, reach and free-flowing information) and *centripetal* forces (connectedness, project manager influence, cross-functional working and temporal pacing) that need to be balanced to ensure new product development success. This is an alternative conceptualisation of the ambidexterity problem, and emphasises the operational aspects. These issues have led to significant debate as to the methods of implementing an ambidextrous form. As Gupta et al. (2006:697) advise, "although near consensus exists on the need for balance [of exploitation and exploration], there is considerably less clarity on how this balance can be achieved".

### 2.5.1 Types of Ambidexterity

The literature has highlighted three major forms of implementing ambidexterity, identified as *temporal*, *structural* and *contextual* ambidexterity. These will now be briefly summarised.

Tushman and O'Reilly (1996) show that during periods of incremental, evolutionary, improvement, an organisation can focus on exploitative learning, becoming better at serving its markets (see also Burgelman, 2002; Siggelkow and Levinthal, 2003). However, many markets experience discontinuous, revolutionary, change, with a radical organisational response required. This represents a *temporal* strategy, where exploitative and exploratory modes are distinguished by time. This is the punctuated equilibrium model (Revilla and Rodríguez, 2011), which the authors describe as one mechanism for organisational ambidexterity. Swart and Kinnie (2007) show how a marketing agency works both within a planned, longer-term framework at account-level, and an accelerated shorter-term view to meet client needs, and how the ability to accommodate these is critical to organisational success. Brown and Eisenhardt (1998) propose that dynamic capabilities can enable a firm to rhythmically switch between exploitative and exploratory functions, but Judge and Blocker (2008) argue that insight needs to be gained into the organisational capabilities that underlie the ability to perform both simultaneously.

A temporal interpretation does not align with some later scholars, who interpret ambidexterity as a pursuit of both paths simultaneously (Benner and Tushman, 2003). Gupta et al. (2006:694) argue that the temporal distinction is “radically different” from these other implementations.

O'Reilly and Tushman (2004) also identify *structural* ambidexterity, whereby firms use separate business units to perform either standard operations or radical innovations, coordinated by senior management. Resources are allocated to each group, but it is important to ensure that separate and appropriate processes are followed by each, since existing (bureaucratic) systems may be wholly inappropriate for exploratory activities. In their study of 35 organisations, they found that the ambidextrous firms using this technique were significantly more successful in launching breakthrough products or services.

This is also advocated by Leonard-Barton (1995) and Christensen (1997). One method of managing both exploitative and exploratory activities is through outsourcing or by establishing alliances so that one of them is performed externally (Raisch and Birkinshaw, 2008). McGrath (2001) also finds that exploratory innovation in development projects is more effective with more project autonomy, and this is in line with the structural partitioning view. Partitioning can perhaps be considered a conceptually simple approach (such as Tushman and O'Reilly, 1999), and has also been offered as a mechanism for implementing organisational change (Bjelland and Wood, 2008). However, practical implementation may be somewhat more complex. Voelpel et al. (2006) discuss the role of ambidexterity in organisational strategy, advocating strategic ‘misfit’ to pre-empt and accommodate market change and capture new opportunities.

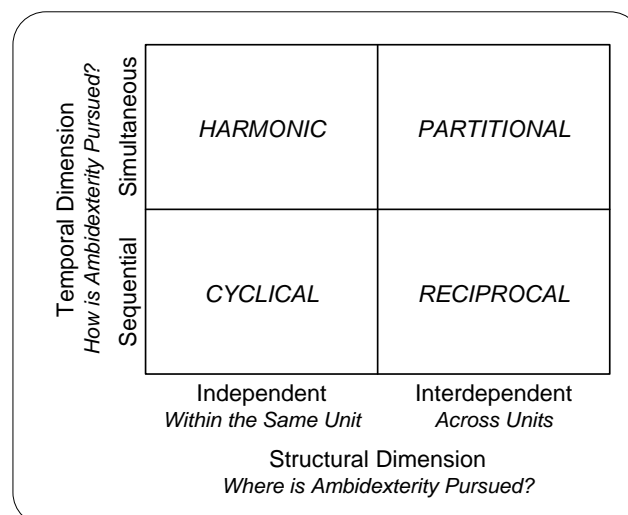
Moore (2005) argues that large organisations can either specialise in complex systems operations (generally focussing on relationships with a small number of customers), or on volume operations with many customers, but rarely both. He terms this choice ‘handedness’, and if the organisation has to ‘hold hands’, then separate organisational structures are recommended. These structurally separate, loosely-coupled, subsystems must be integrated at the senior team level (Benner



and Tushman, 2003). Indeed, leadership-based solutions that make the top management team responsible for reconciling and responding to the tensions between the two activities is emerging as a key theme within the literature (Raisch and Birkinshaw, 2008). However, the structural separation approach to innovation needs to be balanced with the practice-based, person-centred view. Keeping dedicated staff for radical innovation is beneficial, given the difficulty of the task (O'Connor and DeMartino, 2006) and the 'social' aspects are important in developing ambidexterity, as will be developed further, later.

Gibson and Birkinshaw (2004) take a different view, and identify business-unit-level *contextual ambidexterity*, which they define as "the behavioural capacity to simultaneously demonstrate alignment and adaptability" (Gibson and Birkinshaw, 2004:209). The former refers to coherent business activities working towards a common goal, whereas the latter refers to the capacity to reconfigure those activities as required by the task environment. They argue that a context characterised by a combination of *stretch*, *discipline*, *support* and *trust* facilitates this contextual ambidexterity, and the results of their quantitative survey support the link between this and organisational success. Their research showed four ambidextrous behaviours in individuals, specifically: taking the initiative outside their own job roles; cooperative behaviour; brokering, looking to build internal linkages; and multitasking, "comfortable wearing more than one hat" (Birkinshaw and Gibson, 2004:49). This conception of ambidexterity as embedded in mental models of operation is powerful (see also Mom et al., 2009) and provides a significantly different view from many other authors.

Simsek et al. (2009) use two dimensions of ambidexterity, temporal and structural, to develop a typology (Figure 10). The 'cyclical' model is most strongly associated with innovative outcomes, notably product innovation, where firms can generate new technology then exploit it in product sales; the 'partitional' model represents fully separated structural ambidexterity, and the 'harmonic' model represents contextual ambidexterity. The authors admit that the 'reciprocal' is the least researched. However, although this is a powerful classification system, as will be demonstrated, it may be inadequate in fully theorising the nature of ambidexterity.



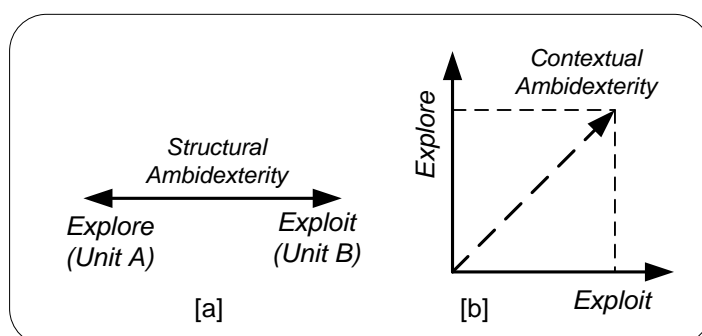
**Figure 10: Typology of Ambidextrous Organisations (Simsek et al., 2009)**

Several key issues of terminology are unresolved within the ambidexterity literature. Firstly, since this review is anchored in the work of March (1991) it is important that the definition used is clearly defined (Gupta et al., 2006; Raisch and Birkinshaw,

2008) (see section 2.4). Secondly, the nature of the relationship between exploitation and exploration is important in our understanding of ambidexterity and the nature of the resources employed.

## 2.5.2 The Orthogonality of Ambidexterity

Gupta et al. (2006) debate whether the concepts of exploration and exploitation represent a continuum, or whether they are in fact orthogonal (considered as perpendicular). They argue that if the resources in a single domain are scarce and pursuing one path necessitates lack of investment in the other, as March (1991) contends, then they may be mutually exclusive. In an ambidextrous form where these modes are structurally separated, the rationale of the units is clear and each represents an end of a unidimensional continuum (Figure 11a). This is the 'partitional' approach (from Simsek et al., 2009), whereby one organisational unit focuses on exploitation, another on exploration, and they are integrated at the senior management level to produce an ambidextrous organisation. It is necessary to distinguish the level of analysis here, because in this example, as Raisch and Birkinshaw (2008:396-7) elaborate, "choices about how to resolve the tension at one level of analysis are often resolved at the next level down. So for example, a business unit may become ambidextrous by creating two functions or subdivisions with different foci, a manufacturing plant may become ambidextrous by creating two different teams (one in charge of enhancements to flexibility and another in charge of efficiency improvements), and a single team may become ambidextrous by allocating different roles to each individual."



**Figure 11: Dimensions of Ambidexterity**

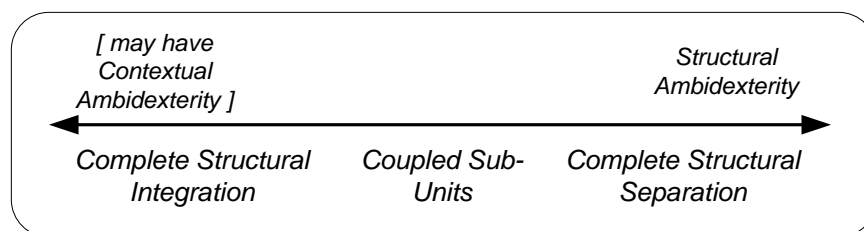
Within a single unit demonstrating 'harmonic' ambidexterity, though, it is more reasonable to argue that there is no specific resource trade-off (March, 1991; Raisch et al., 2009) but that these are orthogonal dimensions of learning (Cao et al., 2009; Gupta et al., 2006), enabled by contextual ambidexterity (Figure 11b).

The argument within the literature goes further, however. After He and Wong (2004), Cao et al. (2009) distinguish between the *balanced* and *combined* concepts of ambidexterity. The 'balanced' state is when the exploratory and exploitative dimensions (accepted in this case as orthogonal) have similar magnitudes, whereas the 'combined' approach conceptualises the combined magnitude. These are two fundamentally different conceptions. Cao et al. (2009) find that the balanced dimension (BD) is more advantageous for smaller, resource-constrained firms, whereas the combined dimension (CD) is more beneficial for larger firms with greater access to resources.

However, continuing with Simsek et al.'s model, I argue that classifying only independent ('harmonic') or interdependent ('partitional') structural ambidexterity (Simsek et al., 2009) also gives an incomplete theoretical representation of the

possibilities discussed by Benner and Tushman (2003). Theory would suggest that there is in fact a continuum between ‘full’ structural ambidexterity (characterised by unit separation and managerial oversight), and high structural integration. Ambidexterity in this latter option may be achieved by contextual ambidexterity, although these should not be considered as polar alternatives. Between these extremes is multi-level sub-unit coupling, which does not feature prevalently in the literature. So, whilst the end-points of structural and contextual ambidexterity may be theoretically well-conceived, there is still ambiguity over other manifestations. In a variation of the structural argument, Benner and Tushman (2003) argue for lower-level analysis of this capability, where “ambidextrous organizations are composed of multiple tightly coupled subunits that are themselves loosely coupled with each other. Within subunits the tasks, culture, individuals, and organizational arrangements are consistent, but across subunits tasks and cultures are inconsistent and loosely coupled.” (Benner and Tushman, 2003:242). Gupta et al. (2006) also point out that exploratory R&D units can work effectively with more slowly-moving and standardised manufacturing and sales groups within an organisation, so the boundary can be considered as less distinct in this case. This infers that structural ambidexterity can be conceptualised on a continuum ranging from spatially separated business units to interdependent functional departments; the literature does not appear to explicitly capture this range of options.

This is represented in Figure 12, showing that structural ambidexterity is itself on a continuum, and it is not clear that the central area on that line is well understood theoretically.



**Figure 12: Continuum of Structural Ambidexterity**

Specifically, this may be an issue with the nature of the empirical research performed to date, and the conception of multiple levels of hierarchy. Raisch and Birkinshaw (2008) argue that contention can be resolved one organisational layer down, yet this may be overly simplistic when considered in many practical contexts. In real-world organisations, multiple coalitions, functions and departments interact, and we must acknowledge that taking each domain on its own may give a different view. The more levels of hierarchy we attempt to consider within an organisation, the less clear it is that a single model of ambidexterity can be usefully applied. In line with Gupta et al. (2006) and Raisch and Birkinshaw (2008), I argue that the lack of multi-level, multi-domain analysis of ambidexterity is limiting our understanding of the concept, and hence this represents an inadequacy within existing theory. This argument also makes the subject of temporal ambidexterity more difficult. For example, an organisational R&D department (which may be considered in the structural ambidexterity context as ‘exploratory’) will use standardised administrative processes, and the manufacturing group (considered as the ‘exploitative’ aspect) may be trialling new techniques alongside standard operations, regardless of whether the wider organisation is in an exploitative or exploratory mode. At lower levels of the organisation, straightforward explanations in terms of structure may not hold, and the analysis of sub-structures can reveal more intricate patterns of exploitation and exploration.

Eisenhardt et al. (2010:1256) write that “although we argue that balancing efficiency and flexibility is at the core of the microfoundations of performance in dynamic environments, we note that a lack of precision about structure, environment and cognition provides an opportunity to elaborate *how* leaders achieve this balance.”

In order to build upon the existing literature, a review of the empirical data on ambidexterity is now presented.

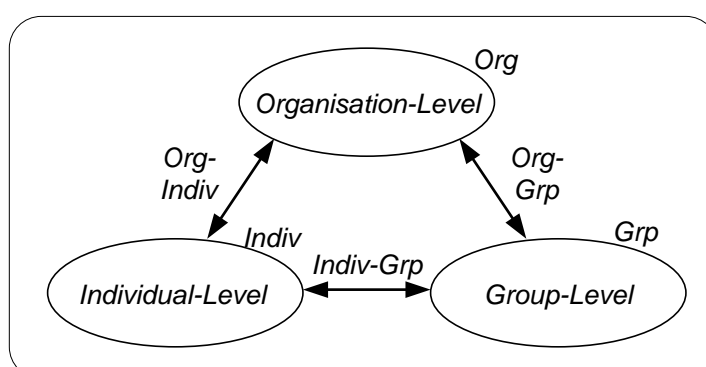
## 2.6 Empirical Research – Evidence and Identification of Gaps

This section reviews the empirical data to date and categorises the findings. A summary of all the empirical literature, identified at the *organisational*, *group* or *individual* level (or a combination of these), is given later in Table 3. It is used to identify areas where empirical research is lacking, thereby highlighting issues suitable for study.

### 2.6.1 Operationalisation of Empirical Work and Identified Themes

There have been multiple empirical studies that have studied the concept of ambidexterity. As highlighted back in Figure 9, the majority of the studies have used surveys and statistical analysis to test hypotheses. As will be discussed in the following sections (and summarised later in Table 3), these studies have been performed in different industrial and geographic markets, mostly at the level of the organisation, and have significantly improved our understanding of the concept of ambidexterity.

However, there have been no overriding trends evident from the research. Analysis of the literature via the systematic review shows that the studies can be broadly categorised in terms of the level of analysis. The *organisational level* covers areas including strategy and structure, the *group level* includes the social context of the work, and the *individual level* is primarily concerned with the managerial role. Note that many studies cover a combination of these (Figure 13). These ideas emerged as the literature was reviewed. It is accepted that these headings do not fully distinguish between the studies, but this provides a multi-level thematic structure for the analysis. It is also acknowledged that other researchers may categorise the papers differently, but these themes provide a suitable framework via which to examine the research.



**Figure 13: Literature Themes from the Systematic Review**

Note that the papers from each of these themes are discussed, and this is subsequently used to narrow the research area. This means that much of the literature review (especially at the organisational level) does not directly inform the subsequent research, but is included for completeness to show what is known about

ambidexterity and to present a broader picture. It therefore contextualises the research that follows.

## 2.6.2 Organisation-Level

The majority of the studies have been at the level of the organisation, and this section highlights those findings. The organisational benefits of ambidexterity (generally measured in terms of financial performance) are given, but some researchers have found examples of when it is not appropriate. Two sub-divisions of this literature focus on marketing perspective, and the role of the firm within its larger industry network. The literature highlights the complexity of, and potential returns from, ambidexterity when considered as an organisational-level construct.

As discussed, Tushman and O'Reilly (1996) use multiple case studies of ambidexterity (and lack thereof) to show that over time, firm strategy needs to support innovation (variation), differentiation (selection) and cost (retention) as markets mature. They emphasise the effects of evolutionary and revolutionary change, the importance of organisational culture in managing transitions, and the idea of having to destroy that culture in periods of upheaval. They highlight a loose-tight culture (overall company culture, but with local adaptation as required).

Several key studies have shown the advantages of ambidexterity. Tushman et al. (2010) use multiple longitudinal case studies to show that firms with an ambidextrous structure have more successful innovation streams, and this requires the senior team to deal with the contradictory internal architectures. He and Wong (2004) test the ambidexterity hypothesis in two forms: ambidexterity as a high score on both the exploration and exploitation axes ("fit as moderating"), or that it has relatively equal emphasis on both dimensions ("fit as matching"). They take exploration and exploitation as two distinct orthogonal dimensions, not as a unidirectional scale. Data was taken from a survey of 206 manufacturing firms in Singapore and Malaysia in 1999-2000, with a dependent variable of sales growth rate over the previous 3 years. They found the interaction between exploratory and exploitative innovation strategies is positively related to sales growth rate, and the relative imbalance (absolute difference) between exploratory and exploitative innovation strategies is negatively related to sales growth rate. In a key finding that helps reduce definitional ambiguity, they also identify that low levels of exploration and exploitation may not contribute to superior firm performance, and therefore such firms should not be regarded as ambidextrous. However, they acknowledge that the 8 survey items used may capture only limited aspects of ambidexterity, and that 3 years is not long-term performance. Although this is frequently cited as a seminal ambidexterity paper, sales growth may be a limited construct in determining performance, and ideally outcome measures should seek to identify more dimensions on which to assess superior results. This was followed by the work of Cao et al. (2009), mentioned earlier.

Katila and Ahuja (2002) operationalise ambidexterity in terms of patent searches, where exploitation is identified as *depth* – the degree to which the search revisits a firm's existing knowledge, and *scope* is defined in terms of the exploration of new knowledge. Their research shows that the interaction was positively related to the number of new products introduced. Kale and Wield (2008) also use three case studies to show how Indian pharmaceutical firms' response to new patent regulations involved developing exploratory capabilities as well as building exploitative ones in order to remain competitive. Cegarra-Navarro and Dewhurst (2007) study 269 Spanish optometry and telecoms businesses and find that exploitation and exploration are positively related to ambidexterity, with

ambidexterity positively related to customer capital. They find that size is not a factor in ambidexterity, although sector is.

Han (2007) defines strategic ambidexterity as the ability to execute paradoxical strategies. In a case study of two banks, she shows that in pursuing ambidexterity in their internationalisation efforts, they achieve above-average performance in both the short and long term. Han and Celly (2008) build on Han (2007) to test international new ventures for ambidextrous strategy (fewer investments, many countries; standardisation and innovation). Testing 70 Canadian firms via survey, they find that this leads to superior performance. Kuckertz et al. (2010) test innovation performance in German high-technology start-ups and find that ambidexterity improves innovation performance, although timing is key. The later a firm becomes ambidextrous and initiates a second innovation project, the lower its overall innovation performance will be.

However, we must be careful in proposing that ambidexterity is always beneficial, or indeed that it can be specifically identifiable in complex organisational systems (Sugarman, 2010). Ebben and Johnson (2005) studied small firms and found that those that followed efficiency or flexibility strategies outperformed those that attempted both. This is not entirely surprising, and can be considered as being in line with the theory discussed earlier. However, such results should caution scholars and practitioners that success via ambidexterity is not a foregone conclusion, and that consideration should be given as to the reasons *why* an ambidextrous strategy should be pursued, if it is to be attempted. Following this argument, it is not proven that ambidexterity is beneficial in the context of managing projects, and this is investigated as part of the research, discussed later.

Evidence has been found of the benefit of structural partitioning in high-technology firms. Vinekar et al. (2006) show how this is used to balance agile and traditional IT development, citing research showing that most system development organisations are trying to use both approaches. Visscher and De Weerd-Nederhof (2006) offer a longitudinal study of an Ericsson R&D centre, and describe how it structured a new development group to develop alternative next-generation technologies. Grover et al. (2007) test the ambidexterity hypothesis in telecommunications firms, using a survey and quantitative analysis amongst 154 large US firms. They find that both mechanistic and organic structures can co-exist to promote exploitative (incremental) and exploratory (radical) innovation. Brion et al. (2010) also find that, in a sample of 108 innovative firms in France, organisations should encourage long-term practices that encourage risk-taking and creativity to build an organisational context suitable for ambidexterity.

De Visser et al. (2010) find that in new product development, radical innovations are best supported by cross-functional structures, whereas incremental innovations are best served by functional organisational structures. Menguc and Auh (2010) investigate Canadian high-tech firms and also find that organisational structure affects new product innovation performance. They identify that radical product innovation is best supported by an informal structure, whilst incremental product innovation is best supported by a formal structure. Gordon and Tarafdar (2010) argue that IT should provide capabilities, tools and control to enhance innovation, and that this should incorporate ambidexterity since standardisation is not appropriate in all circumstances. Pavlou and El Sawy (2010) argue that this should also include 'improvisational capabilities' as an effective response to highly turbulent environments.

Auh and Menguc (2005) studied learning in firms characterised as ‘prospectors’ and ‘defenders’ (Miles and Snow, 1978). They found that for both groups, *exploration* was more positively associated with *effective* firm performance (market share growth or sales growth) than was exploitation. For prospectors, *exploitation* was more positively related to *efficient* firm performance (profitability, return on assets) than was exploration. Again, the success measures and choice of timeframe are therefore highly significant. Menguc and Auh (2008) use a survey to look at 260 Australian manufacturing organisations, and find that, contrary to their expectations, ambidexterity does not have a negative effect on firm performance for either prospectors or defenders. Exploration has a greater positive effect on firm performance than exploitation for prospectors, but it also has a greater positive impact than exploitation on defenders’ firm performance. Sidhu et al. (2004) also find that prospectors have an exploratory orientation, and that this is linked with environmental dynamism and organisational slack.

This is echoed by Ahn et al. (2006), who consider new product development in terms of both business performance and knowledge performance. This is interesting, as the authors treat the business outcomes (60 ITS projects in Korea) in terms of exploitation, and the knowledge performance in terms of longer-term sustainable competitive advantage, demonstrating a more holistic interpretation. This reinforces the argument that careful consideration of outcome measures is an important factor in research design, and that single-factor outcome measures may be a limitation.

Rothaermel and Alexandre (2009) look at technology sourcing, and consider a two-by-two of internal / external sourcing versus new / known technology. They find that the relationship between technology sourcing mix and firm performance is an inverted u-shape, and higher levels of absorptive capacity allow a firm to more fully capture the benefits of ambidexterity in technology sourcing. Kristal et al. (2010) use a survey of US manufacturers, and find that an ambidextrous supply chain strategy enhances combinative competitive capabilities (product quality, delivery speed, process flexibility, low cost) leading to enhanced profit and market share. Hoang and Rothaermel’s (2010) studies in the biotechnology industry show that a firm’s external exploration experience leads to poorer R&D project performance, whereas internal exploration experience enhances the benefits accrued from external exploitation alliances.

Luo and Rui (2009) look at multinational enterprises from emerging economies. They use four Chinese case studies and conceptualise ambidexterity as co-orientation, co-competence, co-opetition and co-evolution. They argue that these help MNEs leverage their strengths whilst alleviating their weaknesses. Russo and Vurro (2010) also investigate cross-boundary ambidexterity in the fuel cell industry, finding that firms that emphasise internal exploration balance it with exploratory inter-organisational agreements, and vice versa.

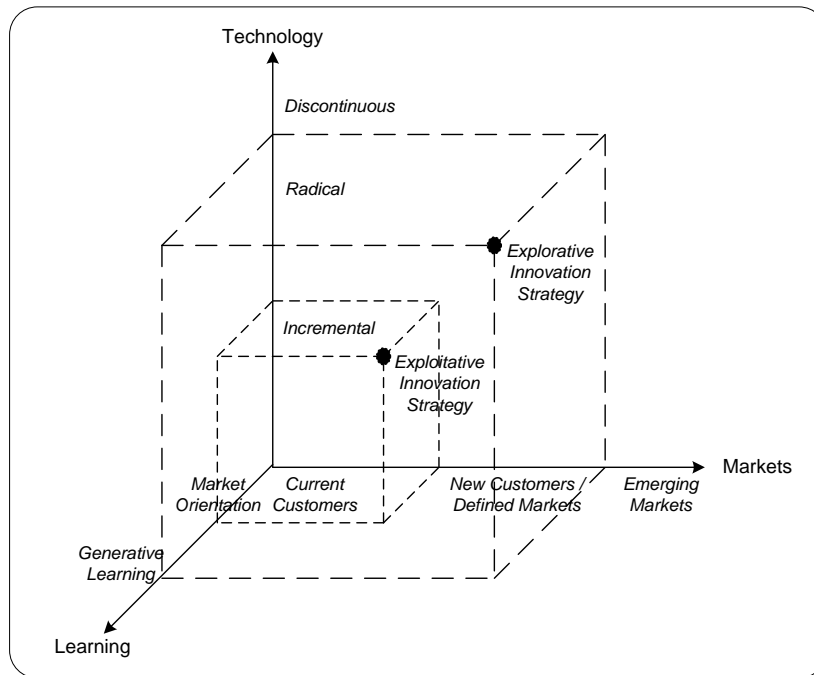
O’Connor et al. (2006) caution that the structural separation approach may be insufficient to develop longer-term organisational capability and they identify that a model of *discovery* – *incubation* – *acceleration* is beneficial in supporting commercialisation. This is reliant on a consideration of organisational structure as a venue for capability development, which they note is a departure from the innovation and dynamic capability literature. This adds more detail to the structural separation argument, and highlights the difficulty of creating long-term business benefit. This is taken up by O’Reilly et al. (2009) who expand upon the mechanisms used by IBM to formalise this approach.

The marketing context has been a strong source of research findings. Whilst this is a difficult area to separate formally from other studies, the use of the word 'marketing' in the summaries became apparent whilst performing the systematic review, and grouping these studies together is therefore appropriate. Li et al. (2008) discuss ambidexterity in the marketing context, performing a quantitative study in 227 high-technology firms in Taiwan. They find that a responsive approach supports incremental innovation and a proactive marketing orientation supports radical innovation, strengthened by a learning orientation within the firm. They advocate a 'total market' orientation by utilising a structural ambidexterity approach. Hughes et al. (2008) look at market knowledge diffusion and business performance from a marketing perspective, using a survey of high-technology manufacturers. They show a positive relationship between organisational learning, market orientation and business performance. Hughes et al. (2010) discuss Mexican high-tech international new ventures, and identify a complex relationship between marketing differentiation strategy, cost leadership strategy or a hybrid of the two, innovation ambidexterity and marketing / cost advantage, and export performance.

Sarkees and Hulland (2009) found, in their survey of 135 senior managers in publicly-traded US firms, that an ambidextrous firm strategy has a positive effect on four dimensions of performance: sales revenues, profits, customer satisfaction, and new product introductions. As an addition to Auh and Menguc's work, they identified that ambidextrous firms generated higher numbers of new product introductions than the firms which emphasise innovation over efficiency. They argue "[t]he fact that ambidextrous firms can outpace innovation-oriented firms in terms of new products is seemingly counterintuitive. Yet, it confirms that efficiency and innovation can be complementary rather than contradictory strategies, as other management researchers have suggested." (Sarkees and Hulland, 2009:49). They also highlight that, in evaluating performance "both tangible and intangible performance metrics should be included." (2009:48). This ambidextrous marketing strategy is further discussed in Sarkees et al. (2010).

Morgan and Berthon (2008) conceive of relationships between market orientation and learning, and their effect on exploratory and exploitative innovation strategies. They use a survey of 160 respondents in the UK bioscience industry to show that: market orientation is positively associated with exploitative innovation strategy, generative learning is positively associated with exploratory innovation strategy, exploitative and exploratory innovation strategies are positively associated with business performance, and firms exhibiting ambidexterity (those specialising in both exploitative and exploratory innovation strategies) are positively associated with business performance. They represent their thinking in the innovation strategy map, as shown in Figure 14, representing how exploratory learning is a far more significant organisational shift than the exploitative equivalent. This striking visual representation highlights the challenge posed in achieving ambidextrous performance. It also perhaps brings into question the notion of a simple linear continuum between exploitation and exploration, in that to achieve an 'equal' shift away from the central point, moving to an exploratory mode may be more challenging when compared to 'business-as-usual'.





**Figure 14: Innovation Strategy Map (Morgan and Berthon, 2009)**

Similarly, Judge and Blocker (2008:916) identify strategic ambidexterity as the “ability to combine exploration and exploitation strategies across product, market, and resource domains.” They refer to this as “flying the plane while rewiring it.” (Judge and Blocker, 2008:915). They propose that organisational capacity for change is an antecedent of strategic ambidexterity, that “[t]he relationship between an organization’s capacity for change and strategic ambidexterity will strengthen during periods of high environmental uncertainty and weaken during periods of low environmental uncertainty.” (2008:921).

Although not immediately apparent, the market-based studies of ambidexterity may have parallels with the context of managing projects. Specifically, given that many complex projects (especially in the IT sector) may ostensibly meet the specification but still fail to meet end-user needs, the idea that both market orientation and generative learning can combine to meet both the explicit and unstated needs of the client is an attractive and practical concept. This also aligns with Geraldi et al.’s (2011a) concepts of project management quality when considered using the lens of ambidexterity theory.

Research has also explored the role of the firm within its industrial network. Riccaboni and Moliterni (2009) look at R&D alliances in the life sciences industry and the evolution of inter-firm networks over a 30-year period. They conclude that companies able to dynamically combine exploration and exploitation occupy a stable position at the core of the network structure and enjoy competitive advantage. Webb et al. (2010) argue that multi-national enterprises should partner with non-governmental organisations to reach ‘base of the pyramid’ markets.

Lin et al. (2007) analyse alliance formation behaviour, and argue that ambidexterity in this context is the simultaneous and balanced presence of both existing and new partners in a firm’s network of alliances. In their study of 33 companies in 5 industries, their analysis shows that large firms will tend to benefit more from an ambidextrous formation of exploratory and exploitative alliances, whereas a small firm will tend to benefit more from a focused formation of either exploratory or exploitative alliances. Additionally, firms with an ambidextrous formation of

exploratory and exploitative alliances will tend to exhibit better performance in an uncertain environment, whereas a firm with a focused approach will tend to have better performance in a stable environment. Lin et al. (2007) subsequently use computer simulation to show that performance is enhanced if the firm takes an ambidextrous approach when it has network centrality, supporting Riccaboni and Moliterni (2009).

Im and Rai (2008) investigate dyadic relationships between a large supply chain solution vendor and its customers, specifically looking at the effect of contextual ambidexterity and ontological commitment (sharing knowledge using a digital boundary object) on exploratory and exploitative learning, and subsequently to relationship performance. Their results support the view that exploratory and exploitative knowledge sharing are reinforcing and synergistic in long-term inter-organisational relationships, and that this is supported by standard electronic business interfaces.

There are clearly a number of studies that explore the effects of ambidexterity at the organisation level. As demonstrated in Table 3 shortly, this categorisation is the largest group of empirical data. It shows much of the 'what' of ambidexterity, with less of the 'how' regarding the practices that enable it. This also needs to be understood further in the context of the social nature of the work and the role of individuals. It is the 'how' that I wish to develop further with this thesis, within a framework of the existing empirical data.

### **2.6.3 Organisation- and Group-Level**

This stream of research is important as it shows how structural ambidexterity may be underpinned by social factors that act as enablers.

Ambos et al. (2008) identify the problem of commercialising university research, given that research excellence and commercialisation can be quite different objectives. They find that at the organisational level, ambidexterity can be achieved through a dual structure approach, such as technology transfer offices. At the individual level, though, they find that an extensive academic career is negatively associated with the project generating significant commercial output (since academic success is not usually influenced by commercialisation of the research), but that scientific excellence is positively associated with commercialisation. They conclude that individual ambidexterity is therefore possible, but that researchers must be motivated to pursue both paths simultaneously if it is to be successful.

Similarly, Chang et al. (2009) look at research commercialisation in Taiwanese universities, and find that a combination of top-down structural ambidexterity, together with bottom-up contextual ambidexterity is most beneficial. Graetz and Smith (2005) also show the need to balance organisational change with human resource considerations in mind. Using a case study at Cisco after a reorganisation, Gulati and Puranam (2009) show that informal organisational operation can complement the formal structure, causing 'compensatory fit', and this can aid ambidexterity.

Sethi and Sethi (2009) investigate ambidexterity from the perspective of whether a focus on quality (which they argue emphasises exploitation) is a detriment to innovative new product development. They identify two dimensions of innovativeness, namely novelty and appropriateness. In a survey of NPD projects within consumer products firms, they find that quality orientation is not adversely related to the novelty of the new products developed by cross-functional

development teams. The authors find that cross-functional teams are therefore a simple and inexpensive method of developing innovative products in quality-oriented organisations, but that they need to be granted autonomy and encouraged to take risks. Haas (2010) also finds that teams with both high levels of autonomy and external knowledge delivered more strategically and operationally effective projects than teams with high autonomy but low external knowledge, or high external knowledge but low autonomy.

In a large financial services firm, Jansen and colleagues (Jansen et al., 2005; Jansen et al., 2006) find that a higher level of centralisation lowers exploratory learning, and a higher level of formalisation is associated with an increase in exploitative learning. They also find that dense social relations have a significant positive effect on both exploratory and exploitative innovation, and, interestingly, that “informal coordination mechanisms (i.e., connectedness) are more important than formal coordination mechanisms (centralization and formalization) in predicting both types of innovation.” (Jansen et al., 2006:1670). However, their work focused on the structural aspects of social connectedness, and they acknowledge the need for further work on the relational dimension. This is in line with Subramanian and Youndt’s (2005) findings that a firm’s social capital enables its capability to develop incremental and radical innovations.

Ambidexterity is a challenging path, though. Andriopoulos and Lewis (2009) use multiple case studies in innovative product development organisations, and identify three paradoxes inherent in ambidexterity: strategic intent (profit – breakthrough), customer orientation (loose – tight) and personal drivers (discipline – passion). These must be accommodated if the organisation is to be successful. They later (Andriopoulos and Lewis, 2010) show how these paradoxes can both fuel and frustrate innovation, that paradoxical management approaches are required, and that paradox guides a common managerial approach, but enables contextual variations. Lee and MacMillan (2008) characterise organisational ambidexterity as deploying both *procedural* and *coordinative* (commonly-held values, beliefs and goals) knowledge-sharing, and find that this is positively and significantly related to organisation subsidiary performance.

Tiwana (2008) looks at the effect of bridging ties and strong ties, based on the work of Burt (1992) and Granovetter (1973), in inter-firm alliances (see also van den Ende and Kijkuit, 2009). He argues that a “network of collaborators with strong ties has greater capacity to implement innovative ideas, but has inherently lower capacity to generate them; a network that is rich in structural holes (i.e., greater bridging ties) has greater capacity to generate new ideas, but has a lower capacity to implement them... In other words, strong ties should complement bridging ties” (Tiwana, 2008:251-2). This is not always a panacea, though, and care needs to be taken (Hansen, 2009). Interestingly, Tiwana also identifies that “A review of the past three decades (1976–2006) of research on social network configurations and strategic alliances reveals ... the predominant use of dyads or alliances rather than projects (where much innovation work within multiform strategic alliances is actually accomplished) as the unit of analysis” (2008:252). He argues that “A project team that simultaneously possesses strong ties and bridging ties will have access to a diverse array of specialized knowledge, perspectives, and skills and have the mechanisms to integrate that knowledge at the project level. This combination of tie characteristics is what Burt (1992) would describe as an ideal configuration” (Tiwana, 2008:259). This argument will be taken forward in the theory development section, later.

Tiwana (2010) later looks at formal and informal control mechanisms in outsourced IT projects. *Formal* control mechanisms can take the forms of *outcome control*, (i.e. what is delivered) and *behaviour control* (i.e. how it is delivered, including methods, procedures, and techniques). The key form of *informal* control is ‘*clan*’ (social) control, which refers to common values, beliefs, and shared goals between the client and vendor and through identifying and reinforcing norms of acceptable behaviour. He finds that combining informal with formal process-based control mechanisms can simultaneously enhance the fulfilment of project goals and development flexibility. However, combining informal with formal outcome-based control mechanisms can instead impair these objectives.

Kang and Snell (2009) provide a key theoretical underpinning of how intellectual capital can be understood in terms of its contribution to ambidexterity, and this is discussed in detail later.

The *organisation-group* literature is valuable in the research presented later in that the social nature of operations becomes apparent, and the concepts of strong and weak ties, and formal and informal control, are part of the coding and analysis.

#### 2.6.4 Individual-Level

Leadership has emerged as a key contributor to ambidexterity and has been seen as the mechanism whereby exploitative and exploratory trajectories are reconciled when utilising structural ambidexterity. Benner and Tushman (2003) argue for this strategic integration at the senior team level, and O'Reilly and Tushman (2008:200) also advise that “ambidexterity is a specific capability embodied in senior leadership’s learning and expressed through their ability to reconfigure existing organizational assets and competencies in a repeatable way to adapt to changing circumstances”. Dover and Dierk (2010) argue that different roles have different foci, and that managers, leaders and entrepreneurs have a rising scale of risk tolerance. They understand managers as more exploitative, leaders as more ambidextrous, and entrepreneurs as more exploratory in the way that they operate.

If organisational units are structurally separated to achieve ambidexterity, it is the responsibility of the top management team (TMT) to ensure coordination such that, together, organisational strategy is executed. Jansen et al. (2008) identify that if exploratory and exploitative business units are structurally separated and are integrated at the senior manager level, this may lead to conflict if individuals within the senior management team are responsible for those units. Their research in a large Dutch financial services provider showed that a strong and compelling shared vision helps resolve those conflicts, aiding both exploratory and exploitative efforts. Interestingly, they do not find that social integration amongst the senior team positively impacts ambidexterity, and suggest that may be because it does not help the reconciliation of conflicting demands.

Mom et al. (2007) investigate managers’ knowledge inflows on activity, and identify that that top-down knowledge inflows (from supervisor or above in the organisational hierarchy) positively relate to managers’ exploitation activities, whilst bottom-up and horizontal knowledge inflows (from subordinates or peer teams) of managers positively relate to these managers’ exploration activities. This begins to explain some of the operational aspects of ambidexterity, but is far from complete. In a later paper, Mom et al. (2009) show that managers’ decision-making authority and also participation in cross-functional interfaces is positively related to ambidexterity. However, they emphasise the relatively large effect of personal coordination compared to more formal mechanisms (see also Subramaniam and

Youndt, 2005). Additionally, they show that the interaction effects of the formal mechanisms with the personal coordination mechanisms are greater than the sum of their parts – the complementary contributions aid ambidexterity.

Lubatkin et al. (2006) investigate the role of the behavioural integration of the top management team in promoting ambidexterity and organisational performance. In a study of 139 small firms, they compared TMT integration with ambidexterity and firm performance. They found that TMT behavioural integration positively influences ambidexterity, which positively influences firm performance. However, TMT behavioural integration also positively influenced firm performance. They argue that using the TMTs of small firms may be similar to looking at the leadership of business units in larger firms, and it follows that this line of argument may also be extended to the leadership of projects. In line with this, Carmeli and Halevi (2009) argue that top management team behavioural integration gives rise to behavioural complexity in a team, which in turn enables strategic decisions balancing exploration and exploitation. This ability to engage in a wide repertoire of behaviours provides key mechanisms that enable organisational ambidexterity. They also assert that contextual ambidexterity plays an important moderating role in the relationship between TMT behavioural complexity and organisational ambidexterity, but argue that further theoretical refinements are needed.

Nemanich and Vera (2009) investigate leadership, learning culture and ambidexterity in the context of an acquisition within a large US-based multinational. They look at three established social dimensions of learning cultures: psychological safety (see also Edmondson, 2008), openness to diversity of opinions and participation in decision making, finding that: transformational leadership is positively related to ambidexterity, transformational leadership is significantly related to culture, and culture is positively related to ambidexterity.

In summary, there is a rich stream of research on the role of the TMT. However, there is less data from 'lower levels' of management within the organisation, and the role of individual managers in facilitating ambidexterity is investigated in the research that is presented later.

## 2.6.5 Organisation- and Individual-Level

Much of the managerial literature is inextricably linked with the structural aspects (a key element underpinning structural ambidexterity theory). However, some elements of organisational practice can be linked separately with the managerial role. Matson and Prusak (2003) discuss the balance between copying best practices exactly, and allowing flexibility for managers' discretion. They advise that high frequency, high predictability processes should be standardised, for high frequency, low predictability processes, options should be offered, and for low frequency, low predictability tasks, access to expert advice should be provided (see also Hall and Johnson, 2009). Taylor and Helfat (2009) use two case studies of organisational technological change, looking at IBM and NCR. New technology needs links to key complementary organisational assets, and middle-management are important to create these linkages. They identify four critical influences to this: economic, structural, social and cognitive.

Jansen et al. (2009) build on their previous work and use a survey to show that the effect of structural differentiation on ambidexterity operates through *informal* senior team social integration mechanisms and *formal* organisational integration mechanisms. (i.e. cross-functional interfaces). This is important in showing in some

detail how both formality and informality are required to be balanced to achieve ambidexterity.

Kollmann and Stöckmann (2010) test the effect of entrepreneurial orientation (EO) on exploitation and exploration. In a sample of 75 German ICT companies, each dimension of EO (risk-taking, innovativeness, proactiveness, competitive aggressiveness and autonomy) stimulates exploratory innovation, whilst only proactiveness and competitive aggressiveness facilitate exploitative innovation. The dimensions have no conflicting effects, indicating that organisations aiming for ambidexterity should aim for high levels of EO. Plambeck and Weber (2010) find that CEOs of firms with a more ambidextrous strategic orientation and a moderate sense of control over their environment are most likely to develop ambivalent issue evaluations. The data supported the authors' expectation that "organisational characteristics that supply diverse perspectives in domains associated with an issue, and that attribute moderate agency to the firm in relation to its environment, foster effortful sensemaking and prompt ambivalence at the executive level" (2010:703). This mindfulness is important in managing to "refrain from forging dogmatic and one-sided strategies or identities" (2010:705).

The *organisation-individual* theme is continued in the research presented later, and the way managers utilise organisational processes is found to be important in understanding the 'how' of ambidexterity.

#### **2.6.6 Group-Level**

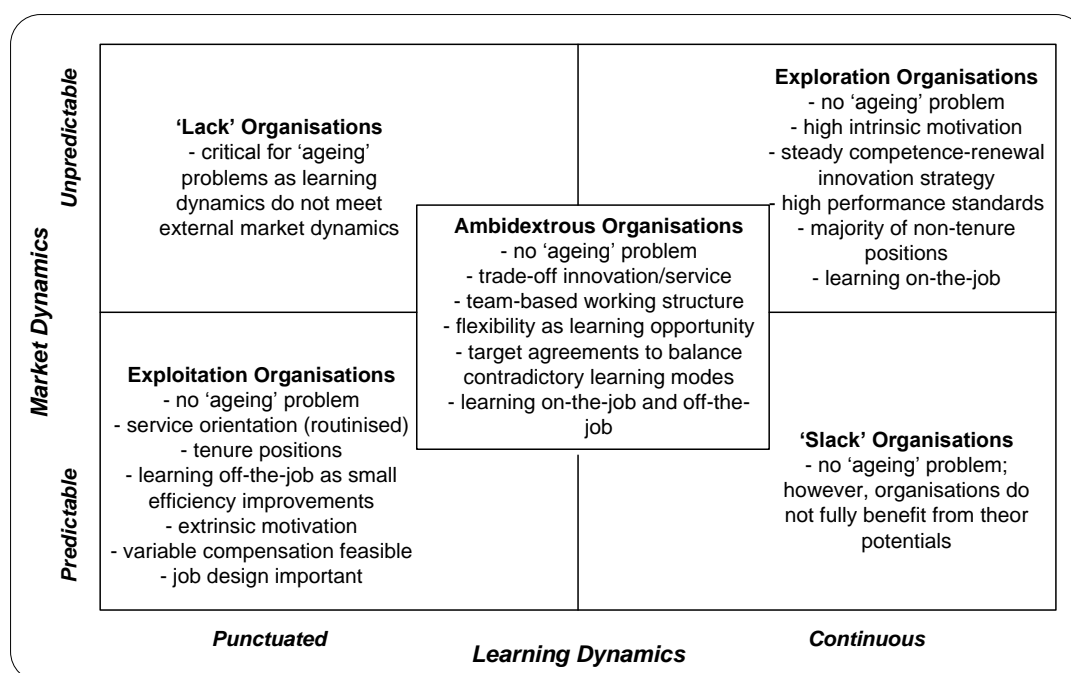
As discussed earlier, Gibson and Birkinshaw (2004) conceptualise ambidexterity as alignment and adaptability, enabled by performance management and social context to generate superior business unit performance. "Alignment activities are geared toward improving performance in the short term. Adaptability activities are geared toward improving performance in the long term." (Gibson and Birkinshaw, 2004:212). They conceive of contextual ambidexterity as "building a set of processes or systems that enable and encourage individuals to make their own judgments about how to divide their time between conflicting demands for alignment and adaptability" (Gibson and Birkinshaw, 2004:210), and these behaviours are supported by organisational incentives. They find evidence that this links positively to business performance (although using subjective success measures), and also note the importance of senior executives in setting the context within the organisation. It is noted that this paper has been categorised as *group-level*, although it could also be classed as *group-individual*.

MacCormick and Parker (2010) analyse 4 theoretically competing organisational climates (climates for internal control, external control, internal flexibility and external flexibility). Having all four of these is positively linked to business effectiveness, and this can be understood in terms of the Gibson and Birkinshaw (2004) ideas, since the organisation supports both control and flexibility aspects.

Along similar lines, McLaughlin et al. (2008) discuss the significance of organisational culture in an engineering company and Katz (2005) highlights the importance and difficulty of motivating specialists (specifically, technical staff). Empirical testing within 102 Indian firms by Ketkar and Sett (2009) shows that ambidextrous HR practices constitute a distinct dimension of HR flexibility, and that these practices can be traced through to enhanced firm performance. Brown (2004) describes a form of ambidexterity where the firm must not only look after its core business, but also be cognisant of events at the periphery that may become

mainstream. This may be accomplished by establishing 'listening posts', communities of practice and social software tools.

Güttel et al. (2009) use the case of an R&D organisation and show how HR methods for exploratory, exploitative and ambidextrous units differ to avoid knowledge and competence obsolescence. They link the learning style to the market dynamics (predictable or unpredictable) and show that ambidexterity balances the opposing forces. Their summary model is shown in Figure 15.



**Figure 15: Learning Configurations (Güttel et al., 2009)**

Kaplan and Henderson (2005) suggest that incentives and cognition co-evolve so that organisational competencies or routines are as much about building knowledge of 'what should be rewarded' as they are about 'what should be done', which is difficult under conditions of uncertainty. They call for a greater emphasis of how collective action can emerge through the interactions of individuals, linking micro-processes to macro-changes to help explain the heterogeneity of firm performance. A multi-level analysis of project ambidexterity would support this request.

In software development projects, Vinekar et al. (2006) emphasise the role of individuals and groups, whilst Lee et al. (2006) find that social processes aid in complex situations, and distributed teams require more rigour and process as the tacit knowledge is harder to share. Revilla and Rodriguez (2011) use a study of 78 new product developments in Spain to analyse team ambidexterity (including punctuated equilibrium). Successful, high-ambidexterity projects are associated with high team vision and greater strategic fit.

Beckman (2006) looks at how firm behaviours are influenced by their founder members' previous employment affiliations. From a sample of 141 Silicon Valley firms, founders whose members come from the same company exhibit more exploitative behaviour, those from many different companies are more exploratory, and those with both are more ambidextrous in their approach and have higher levels of performance. This is interesting in that it may also be applicable to project team members.

The social context of exploitation and exploration plays a key role in the research presented in this thesis, and the importance of the theme is subsequently shown.

### 2.6.7 Group- and Individual-Level

Aubry and Lievre (2010) use two case studies of polar expeditions (which they understand as projects) to show that both exploitative and exploratory capability is required from the leader ('project manager') to deal with the difficulties of the task environment. They argue that this is in contrast to the argument that 'best practices' (i.e. rational exploitation) most effectively serve to bring about project success.

Gratton and Erickson (2007) look at the performance of large teams and show that four of the traits that are important to teams can also undermine them: large size, diversity, virtual participation and high education levels. They find the following eight factors beneficial in promoting success: (1) investing in 'signature relationship practices' and promoting collaborative behaviour; (2) modelling collaborative behaviour so that executives lead by example; (3) creating a 'gift culture' by mentoring, coaching and building networks; (4) ensuring the requisite skills; (5) supporting a strong sense of community; (6) assigning ambidextrous leaders who both task- and relationship-oriented; (7) building on heritage relationships – building new teams consisting of at least some people who already know each other, and (8) understanding role clarity and task ambiguity, so that individuals have roles even if the team is given latitude as to how to achieve its goals.

Güttel and Konlechner (2009) provide a qualitative account of contextual ambidexterity using a case study approach. Their study, in a multi-unit European research firm, attempts to determine how research and commercialisation can co-exist. They find four structural elements that keep ambidextrous organisations in line: an operationalised business model and target agreements; semistructures – a combination of detailed procedures and simple rules (see also Brown and Eisenhardt, 1997) with loose-tight relationships to balance flexibility with structure; fluid project-based structures for rapid adaptation to new demands; and flexibility via HR systems. They also find that cultural values and social norms, shared language and mutual understanding are important in fostering contextual ambidexterity. Rather than directly controlling, as may be expected in a 'pure' structural ambidexterity approach, the TMT maps out the boundaries of the 'strategic corridor' that the organisation must keep within, monitoring rather than integrating the exploitative and exploratory activities. Güttel and Konlechner (2009) argue that in structurally divided units, the TMT needs to translate knowledge from exploiting units to exploring units and vice versa; in contextually ambidextrous organisations, projects serve as knowledge bridges, and since an employee may be a member of more than one project concurrently, he or she needs to alternate between exploratory and exploitative activities based on judgement. Project-based organisations can therefore create a context where employees can alternate between exploration and exploitation.

It is noteworthy that only three papers have been categorised as *group-individual*. Given the more significant attention paid to the organisational-level aspects of ambidexterity, this emphasises the lack of empirical data at the lower, operational levels.

### 2.6.8 Summary – Identifying a Research Area

In summary, the empirical evidence has been examined via the systematic review process, and this has highlighted the areas in which scholars have undertaken



research. I again emphasise that the categorisation is broad and contains an element of subjectivity, since many papers contain multiple themes and it is accepted that other researchers may categorise differently. However, the purpose was to examine what is known in terms of empirical ambidexterity research and to identify an appropriate area of investigation.

A summary of individual papers within each category is given below. Note that the papers identified with [\*] were from the *explor\**, *exploit\**, *learn\** literature rather than the *ambidex\** review.

**Table 3: Summary of Empirical Data**

<i>Paper</i>	<i>Type</i>	<i>Method</i>	<i>Details</i>
<b>Organisation-Level</b>	<b>Org</b>	<b>36</b>	
Ahn et al. (2006)	Qual and Quant	Interviews and Survey	Authors consider new product development in terms of business performance and knowledge performance. This treats the business outcomes in terms of exploitation and the knowledge performance in terms of longer-term sustainable competitive advantage. They study 60 ITS projects in Korea, using both interviews and a survey. Model developed.
[*] Auh and Menguc (2005)	Quant	Survey	Prospectors and defenders: <i>exploration</i> more positively associated with <i>effective</i> firm performance (market share growth or sales growth) than was exploitation. For prospectors, <i>exploitation</i> was more positively related to <i>efficient</i> firm performance (profitability, return on assets) than was exploration.
Brion et al. (2010)	Quant	Survey	Sample of 108 innovative firms in France. Firms should encourage long-term practices that encourage risk-taking and creativity to build an organisational context suitable for innovation ambidexterity.
Cao et al. (2009)	Quant	Survey	Survey of Chinese high-tech parks. They find that the balance dimension (BD) is more advantageous for smaller, resource-constrained firms, whereas the combined dimension (CD) is more beneficial for larger firms with greater access to resources.
Cegarra-Navarro and Dewhurst (2007)	Quant	Survey	Study of 269 Spanish optometry and telecoms businesses. Exploitation and exploration positively related to ambidexterity; ambidexterity positively related to customer capital. Size not a factor in ambidexterity, although sector was.

De Visser et al. (de Visser et al., 2010)	Quant.	Survey	Survey finding that in new product development, radical innovations are best supported by cross-functional structures, whereas for incremental innovations, are best served by functional organisational structures.
[*] Ebben and Johnson (2005)	Quant	Survey	In surveys of 200 and 144 firms, they find that those that mixed efficiency and flexibility strategies significantly underperformed.
Gordon and Tarafdar (2010)	Quant	Survey	IT should provide capabilities, tools and control to enhance innovation. This should incorporate ambidexterity since standardisation is not appropriate in all circumstances.
Grover et al. (2007)	Quant	Survey	Study in telecommunications firms, using a survey and quantitative analysis amongst 154 large firms in the US. Using structural equation modelling they find that both mechanistic and organic structures can co-exist to promote exploitative (incremental) and exploratory (radical) innovation.
Han (2007)	Qual	Case	Defines strategic ambidexterity as the ability to execute paradoxical strategies of pro-profit and pro-growth. In a case study of two banks, she shows that in pursuing ambidexterity in their internationalisation efforts, they achieve above-average performance in both the short and long term.
Han and Celly (2008)	Quant	Survey	Test of international new ventures for ambidextrous strategy (fewer investments, many countries; standardisation and innovation). Testing 70 Canadian firms, via survey they find that this leads to superior performance.
He and Wong (2004)	Quant	Survey	Testing the ambidexterity hypothesis in two forms: ambidexterity as a high score on both the exploration and exploitation axes ("fit as moderating"), or that it has relatively equal emphasis on both dimensions ("fit as matching"). Survey of 206 manufacturing firms in Singapore and Malaysia in 1999-2000, with a dependent variable of sales growth rate over the previous 3 years. They found the interaction between exploratory and exploitative innovation strategies is positively related to sales growth rate, and the relative imbalance (absolute difference) between exploratory and exploitative innovation strategies is negatively related to sales growth rate.

Hughes et al. (2008)	Quant	Survey	Survey of high-technology manufacturers. From 149 responses they show a positive relationship between organisational learning, market orientation and business performance. Survey instrument included.
Hughes et al. (2010)	Quant	Survey	Mexican high-tech international new ventures. Complex relationship between marketing differentiation strategy, cost leadership strategy or a hybrid of the two, innovation ambidexterity and marketing/cost advantage, and export performance.
Im and Rai (2008)	Quant	Survey	Ambidextrous relationship between supply chain vendor and customers aids performance, also enhanced by shared ontological commitment via IT. Limited detail of survey instrument.
Kale and Wield (2008)	Qual	3 Cases	Indian pharmaceutical firms' response to new patent regulations involved developing exploratory capabilities as well as building exploitative ones in order to remain competitive.
[*] Katila and Ahuja (2002)	Quant	Survey	Ambidexterity in terms of patent searches, where exploitation is identified as <i>depth</i> – the degree to which the search revisits a firm's existing knowledge, and <i>scope</i> is defined in terms of the exploration of new knowledge. Their research in robotics firms shows that the interaction was positively related to the number of new products introduced
Kristal et al. (2010)	Quant	Survey	Survey of US manufacturers: they find that ambidextrous supply chain strategy enhances combinative competitive capabilities (product quality, delivery speed, process flexibility, low cost) leading to enhanced profit and market share.
Kuckertz et al. (2010)	Quant	Survey	Innovation performance in German high-technology start-ups via survey. Ambidexterity improved innovation performance, although timing is key. The later a firm becomes ambidextrous and initiates a second innovation project, the lower its overall innovation performance will be.
Li et al. (2008)	Quant.	Survey	Ambidexterity in the marketing context – a quantitative study in 227 high-technology firms in Taiwan. Using previously-developed measures from a number of sources, they find that a responsive approach supports

			incremental innovation and a proactive marketing orientation supports radical innovation. Additionally the latter is strengthened by a learning orientation within the firm. They advocate a 'total market' orientation by utilising a structural ambidexterity approach.
Lin et al. (2007)	Quant	Data analysis and simulation	Large firms will tend to benefit more from an ambidextrous formation of exploratory and exploitative alliances, whereas a small firm will tend to benefit more from a focused formation of alliances. Firms with an ambidextrous formation will tend to exhibit better performance in an uncertain environment, whereas a firm with a focus approach will tend to have better performance in a stable environment.
Luo and Rui (2009)	Qual	Cases	4 Chinese case studies, conceptualising ambidexterity as co-orientation, co-competence, co-opetition and co-evolution. They argue that these help EM MNEs leverage their strengths whilst alleviating their weaknesses.
Menguc and Auh (2008)	Quant	Survey	The effect of ambidexterity on prospector and defender firms. Using a survey of 260 Australian manufacturing organisations, they find that, contrary to their expectations, ambidexterity does not have a negative effect on firm performance for either prospectors or defenders. Exploration has a greater positive effect on firm performance than exploitation for prospectors, but it also has a greater positive impact than exploitation on defenders' firm performance.
Menguc and Auh (2010)	Quant	Survey	Canadian high-tech firms: organisational structure affects new product innovation performance. Radical product innovation is best supported by an informal structure, whilst incremental product innovation is best supported by a formal structure.
Morgan and Berthon (2008)	Quant	Survey	Marketing perspective. Survey of 160 respondents in the UK bioscience industry to show that: market orientation is positively associated with exploitative innovation strategy, generative learning is positively associated with explorative innovation strategy, exploitative innovation strategy is positively associated with business performance, explorative innovation strategy is

			positively associated with business performance, and firms exhibiting ambidexterity are positively associated with business performance.
O'Connor et al. (2006)	Qual	Empirical, Cases, Qual	12 longitudinal case studies to investigate how large organisations can foster radical innovations internally. The structural separation approach may be insufficient to develop longer-term organisational capability, and they identify that a model of <i>discovery</i> – <i>incubation</i> – <i>acceleration</i> is beneficial in supporting commercialisation.
O'Reilly and Tushman (2004)	Qual	Cases	Structural ambidexterity beneficial for multiple organisations. Separated units with senior management integration.
O'Reilly et al. (2009)	Qual	Single case	Darwinian view of organisational evolution: case study of IBM and its mechanisms of looking and supporting at the long term emerging business opportunities (exploration) as well as the short-term (exploitation).
Pavlou and El Sawy (2010)	Quant	Survey	Improvisational capabilities as a response to highly turbulent environments, enabled by IT.
Riccaboni and Moliterni (2009)	Quant	Data analysis	Long-term evolution of inter-firm networks. Ambidexterity linked to network centrality and competitive advantage.
Rothaermel and Alexandre (2009)	Quant	Survey	Considering technology sourcing as a 2x2: internal/external sourcing versus new/known technology. In a quantitative survey they find that the relationship between technology sourcing mix and firm performance is an inverted u-shape, and higher levels of absorptive capacity allow a firm to more fully capture the benefits of ambidexterity in technology sourcing.
Russo and Vurro (2010)	Quant	Survey	Investigation of cross-boundary ambidexterity in the fuel cell industry, finding that firms that emphasise internal exploration balance it with exploratory inter-organisational agreements, and vice versa.
Sarkees and Hulland (2009)	Quant	Survey	135 US marketing managers. Positive effects of ambidexterity on revenues, profits, customer satisfaction, new product introduction.
Sarkees et al. (2010)	Quant	Survey	Ambidextrous marketing strategy associated with superior revenue, profitability, customer satisfaction and new product introduction volume.
[*] Sidhu et al. (2004)	Quant	Survey	Survey in Dutch metal and engineering sectors. Exploratory orientation linked

			with environmental dynamism, strong mission, prospector orientation and organisational slack.
Sugarman (2010)	Case	Single-Case	Review of organisational changes and types of learning at the New York Police Department.
Tushman and O'Reilly (1996)	Case	Multi-case	Over time, firm strategy needs to support innovation (variation), differentiation (selection) and cost (retention) as markets mature.
Tushman et al. (2010)	Case	Multi-case	Multiple longitudinal case studies. Firms with an ambidextrous structure have more successful innovation streams, and this requires the senior team to deal with the contradictory internal architectures.
Visscher and De Weerd-Nederhof (2006)	Qual	Case	Study of Ericsson R&D centre, structural ambidexterity by having a UMTS group separate from DECT development.
<b>Organisation- and Group-Level</b>	<b>Org-Grp</b>	<b>14</b>	
Ambos et al. (2008)	Quant.	Survey and archive.	University research ambidexterity – how to commercialise research output. Can be achieved by dual structure; at an individual level a long tenure is negatively associated with ambidexterity, scientific excellence is positively associated with commercialisation.
Andriopoulos and Lewis (2009)	Qual	Cases, interviews	Using 5 case studies in innovative organisations, they show that there are five paradoxes – strategic intent (profit – breakthrough), customer orientation (loose-tight) and personal drivers (discipline – passion).
Andriopoulos and Lewis (2010)	Qual	Cases, interviews	Using 7 case studies in innovative organisations, they show that paradoxes can both fuel as well as frustrate innovation. Paradoxical management approaches are required, and paradox guides a common managerial approach but enables contextual variations.
Chang et al. (2009)	Quant	Survey	Look at research commercialisation in Taiwanese universities, and, through 229 survey responses, find that a combination of top-down structural ambidexterity, together with bottom-up contextual ambidexterity is most beneficial.
Graetz and Smith (2005)	Qual	Case	Further education institute – change management can be considered in terms of the ambidexterity of 'controllability' and 'responsiveness'. Successful change through managing structures, processes

			and boundaries, balancing the dualities of new and traditional forms
Gulati and Puranam (2009)	Qual	Case	Informal organisational operation can complement the formal structure, causing 'compensatory fit' and can aid ambidexterity. Case study at Cisco after a reorganisation.
Haas (2010)	Quant	Survey	Teams with both high levels of autonomy and external knowledge delivered more strategically and operationally effective projects than teams with high autonomy but low external knowledge, or high external knowledge but low autonomy.
Jansen et al. (2005); Jansen et al. (2006)	Quant	Survey	Ambidexterity in a large financial institution, and then follow-up to gather more data. Data set was 283 surveys followed by 79 further responses. They investigate the importance of both formal and informal social relations in coordinating both exploratory and exploitative innovation.
Kang (2006)	Quant	Survey	Bilateral learning in Law Firms. Mixed-method, but primarily quant. Develops key intellectual capital model.
Lee and MacMillan (2008)	Quant	Survey	Knowledge-sharing within Korean chaebols, specifically investigating the transfer of <i>procedural knowledge</i> and <i>coordinative knowledge</i> . Organisational ambidexterity (deploying both procedural and coordinative knowledge-sharing) is positively and significantly related to subsidiary performance.
Sethi and Sethi (2005)	Quant	Survey	Survey of 141 NPD projects in consumer product firms. A quality orientation does not adversely affect novelty in cross-functional teams; encouragement to take risks improves novelty though reduces appropriateness.
Tiwana (2008)	Quant	Survey	Bridging ties and strong ties in project alliances. Survey from 42 project alliances within a large American services conglomerate in 2000–2002. Ties aid knowledge integration which aids ambidexterity. Survey items given.
Tiwana (2010)	Quant	Survey	Formal and informal control mechanisms in outsourced IT projects. He finds that combining informal with formal process-based control mechanisms can simultaneously enhance the fulfilment of project goals and development flexibility. However, combining informal with formal outcome-based control mechanisms can instead impair these objectives.
<b>Individual-Level</b>	<b>Indiv</b>	<b>5</b>	

Dover and Dierk (2010)	Quant	Survey and Cases	Different foci of managers, leaders and entrepreneurs – rising scale of risk tolerance. Managers understood as more exploitative, leaders as more ambidextrous, entrepreneurs more exploratory.
Jansen et al. (2008)	Quant	Survey	Senior team attributes in a large Dutch financial institution. Shared vision and contingency rewards help achieve organisational ambidexterity.
Lubatkin et al. (2006)	Quant.	Survey	139 small firms investigated by survey. TMT behavioural integration linked to ambidexterity and firm performance.
[*] Mom et al. (2007)	Quant	Survey	Survey in electronics firms. Top-down knowledge inflows positively relate to managers' exploitation activities, whilst bottom-up and horizontal knowledge inflows of managers positively relate to these managers' exploration activities.
Mom et al. (2009)	Quant	Survey	Five large firms. Survey finds that decision-making authority and also participation in cross-functional interfaces is positively related to ambidexterity.
Nemanich and Vera (2009)	Quant	Survey	Large US multinational in the context of an acquisition. 71 teams, 453 individuals. Transformational leadership was positively related to ambidexterity, transformational leadership was significantly related to culture, and culture was positively related to ambidexterity.
<b>Group-Level</b>	<b>Grp</b>	<b>9</b>	
Beckman (2006)	Qual and Quant	Interviews, survey and archival methods.	Sample of 141 Silicon Valley firms, founders whose members come from the same company exhibit more exploitative behaviour, those from many different companies are more exploratory, and those with both are more ambidextrous in their approach and have higher levels of performance.
Birkinshaw and Gibson (2005); Gibson and Birkinshaw (2004)	Quant	Mixed-method	Ambidexterity conceptualised as alignment and adaptability, enabled by performance management and social context to generate superior business unit performance. Mixed-method design, interviews within business units, followed by a survey. Survey of 4195 individuals in 41 business units from 10 firms in various countries. They found evidence that this linked positively to business performance.
Güttel et al. (2009)	Qual	Case	R&D organisation, HR methods for exploratory, exploitative and ambidextrous work to avoid knowledge



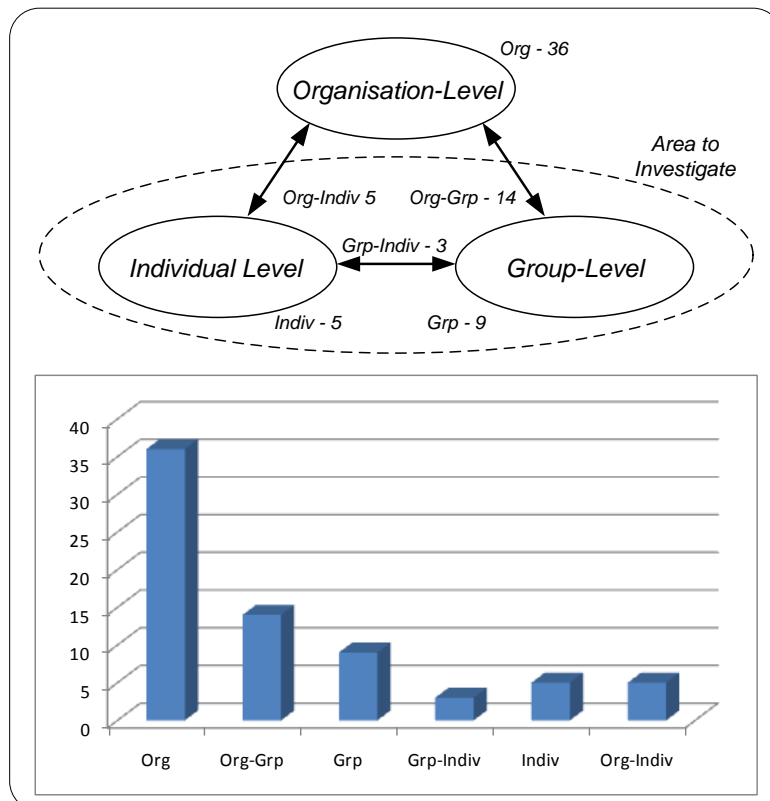
			and competence obsolescence.
Ketkar and Sett (2009)	Quant	Survey	Quantitative empirical testing test within 102 Indian firms showed that ambidextrous HR practices constitute a distinct dimension of HR flexibility, and that these practices could be traced through to enhanced firm performance.
Lee et al. (2006)	Qual	Multiple semi-structured interviews	Global software development requires coping strategies to balance flexibility and rigour. Qualitative data gained from 1-hour interviews with 22 managers across 7 countries in multiple industries, their findings suggest that for globally distributed software teams, flexibility is balanced with process, but agile development methods need to be supported by more rigour and discipline when not co-located. 7 coping strategies identified.
MacCormick and Parker (2010)	Quant	Survey	Authors analyse 4 theoretically competing organisational climates (climates for internal control, external control, internal flexibility and external flexibility). Having all four of these is positively linked to business effectiveness.
McLaughlin et al. (2008)	Qual	Single Case	Significance of organisational culture in an engineering firm. Qualitative analysis of cultural archetypes to assess innovation on an explore – exploit continuum.
Revilla and Rodriguez (2011)	Quant	Survey	Study of 78 new product developments in Spain analysing team ambidexterity (inc. punctuated equilibrium). Successful, high-ambidexterity projects associated with high team vision, more trade-offs and greater strategic fit.
<b>Group- and Individual-Level</b>	<b>Grp-Indiv</b>	<b>3</b>	
Aubry and Lievre (2010)	Qual	2 Cases	Managers balancing both exploitative and exploratory capability as required by the task environment (two polar expedition case studies).
Gratton and Erickson (2007)	Quant	Survey	55 large teams. Four traits that can undermine teams – large size, virtual participation, diversity, high education levels. Needs ambidextrous leaders that can focus on both the task and relationships.
Güttel and Konlechner (2009)	Qual	Large Case	Large European research organisation. Contextual ambidexterity, supported by formal structures as well as cultural values and norms in the organisation.

			Ambidexterity developed within the organisation, TMT monitors rather than integrates.
<b>Organisation- and Individual- Level</b>	<b>Org- Indiv</b>	<b>5</b>	
Jansen et al. (2009)	Quant	Survey	Survey to show that effect of structural differentiation on ambidexterity operates through informal senior team social integration mechanisms and formal organisational integration mechanisms. (i.e., cross-functional interfaces).
Kollmann and Stöckmann (2010)	Quant	Survey	Effect of entrepreneurial orientation on exploitation and exploration. Sample of 75 German ICT companies. Each dimension of EO (risk-taking, innovativeness, proactiveness, competitive aggressiveness and autonomy) stimulates exploratory innovation, whilst only proactiveness and competitive aggressiveness facilitate exploitative innovation.
Matson and Prusak (2003)	Qual	Cases	Balance between copying best practices exactly and allowing flexibility for managers' discretion. Balance between replication and discretion in disseminating and using processes. High frequency, high predictability – standardise. High frequency, low predictability – suggest options. Low frequency, low predictability – provide access to expert advice.
Plambek and Weber (2010)	Quant	Survey	Authors find that CEOs of firms with a more ambidextrous strategic orientation and a moderate sense of control over their environment are most likely to develop ambivalent issue evaluations.
Taylor and Helfat (2009)	Qual	Cases	Case studies of organisational technological change – looking at IBM and NCR. New technology needs links to key complementary organisational assets. Middle-management important to create these linkages, there are four critical influences to this: economic, structural, social and cognitive.

It is apparent from the literature review, and highlighted in Figure 16 below, that there is an imbalance in the nature of the studies performed. Specifically, there are a lower proportion of 'micro-level' studies of the mechanisms underlying the achievement of ambidexterity taken at the individual and group level. Similarly, although the roles of managers and TMTs have been studied, relatively little has been done regarding how managers actually manage exploration and exploitation.

With this in mind, it is appropriate to investigate further *how* ambidexterity may be achieved in practice such that a better understanding may be gained.

This concurs with Chermack et al. (2010:149), who advise that “academicians and practitioners need to work together to fill the gap in the literature with respect to the ‘how it works’ part of OA [organisational ambidexterity]” and that they “should consider focusing their work on OA in teams and individuals, because the majority of the research base is on the organizational level.” This is supported by Figure 16, which shows the relative imbalance of micro-level studies compared to organisation-level investigations.



**Figure 16: Literature Themes from Review of Empirical Data**

Broadly, then, the area of investigation is intended to focus at the individual and group level region highlighted in Figure 16. The studies identified here highlight the significance of the manager and the social and individual contribution to ambidexterity, but as yet the micro-processes underlying the achievement of this state are not fully understood. The fact that the ‘grp-indiv’ category has so few empirical studies indicates the limited research in this area when compared to other research. Additionally, these studies neither explain how such micro-processes enable ambidexterity, nor how such ambidextrous learning leads to organisational benefit. This is the area in which I wish to build upon the existing studies and add a contribution to knowledge. Given the significance of the managerial role, yet the lack of data on the actual practices that underpin the attainment of ambidexterity, this is an area on which to focus.

## 2.6.9 Towards a Research Model

From analysis of the empirical studies, it is far from evident that there is a clear understanding of the mechanisms by which ambidexterity is achieved within organisations, and how this relates to organisational performance. Whilst some of

the antecedents of ambidexterity have been identified, and the benefits (or not) of organisational ambidexterity have been evaluated, the literature lacks a holistic understanding of *how* these benefits are achieved. This is especially evident at the micro-level encompassing the individual and group / social aspects.

It is appropriate to address the *how* question by attempting to identify the elements (including at the micro-level) that underlie the achievement of ambidexterity, and link these to the organisational outcomes. Put simply, what resources does an organisation draw on to attain ambidexterity, and how does this lead to benefit? These two questions have been answered in part, but the literature lacks a coherent argument that traces these elements through.

Therefore the research can be served by approaching it in terms of *inputs*, *processes* and *outputs*. This is discussed by Simsek (2009), who provides a suitable framework for analysis, as shown in Table 4 (see also Raisch and Birkinshaw, 2008).

**Table 4: Input-Process-Output (from Simsek, 2009)**

<i>Input</i>	<i>Process</i>	<i>Output</i>
Antecedents of organisational ambidexterity (e.g. organisation-, interfirm- and environment-level)	Components of organisational ambidexterity (e.g. exploitation and exploration)	Consequences of organisational ambidexterity (e.g. financial performance).

The argument is reinforced by considering the empirical evidence of ambidexterity in this manner. Some of the studies from the systematic review can be categorised as following this structure in terms of their analysis of ambidextrous phenomena, as shown in Table 5.

**Table 5: Input-Process-Output Papers from the Systematic Review**

<i>Paper</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>
Gibson and Birkinshaw (2004)	Performance management, social context (stretch, discipline, support and trust)	Ambidexterity as alignment and adaptability.	Business unit performance.
Han (2007)	Standardisation + many countries; few subsidiaries + customisation; centralisation + decentralisation	Ambidexterity as simultaneous pro-growth and pro-profit strategies.	Above average financial and market performance.
Hughes et al. (2010)	Marketing differentiation strategy, cost leadership strategy, or a hybrid of the two.	Marketing differentiation advantage, cost leadership, innovation ambidexterity.	Export venture performance.
Im and Rai (2008)	Contextual ambidexterity and ontological commitment.	Exploitative and exploratory knowledge sharing in long-term	Relationship performance.

		organisational relationships.	
Jansen et al. (2006)	Firm centralisation and formalisation, 'connectedness' amongst members, environmental dynamism and competitiveness.	Ambidexterity (exploitation and exploration innovation).	Organisational unit profitability.
Kristal et al. (2010)	Exploitative and exploratory supply chain strategy.	Combinative competitive capabilities (product quality, delivery speed, process flexibility, low cost)	Profit level and market share.
Kuckertz et al. (2010)	Exploitation and exploration	Innovation performance	Venture performance
Lubatkin et al. (2006)	Top management team behavioural integration.	Ambidexterity (exploitation and exploration).	Firm performance (inc. sales and market share growth, returns on equity and total assets).
Menguc and Auh (2010)	Organisational structure.	Radical and incremental innovation capability.	New product performance.
Morgan and Berthon (2008)	Market orientation and generative learning.	Exploitative and exploratory innovation strategy, respectively.	Competitive position, sales growth, profit per customer, ROI, overall firm performance.
Sethi and Sethi (2009)	Quality orientation and encouragement to take risks.	'Novelty' and 'Appropriateness' in new product development.	Product performance (sales, market share, profit).

Insight can be gained from analysis of these eleven papers. It is notable that each uses quantitative measures of performance, and all but one (Han, 2007) use survey methods for the research. Although Han (2007) is based on two case studies, it is the financial performance measures that are used as an 'output'. These studies are primarily at the organisation-level (seven studies) or 'organisation-group' (Jansen et al., 2006). Of the remaining three, two are at group-level (Gibson and Birkinshaw, 2004; Sethi and Sethi, 2009) with Lubatkin et al.'s (2006) work at the individual level. However, all three use performance measures at the firm or business-unit level.

From Table 5, it is apparent that the underlying micro-mechanisms and managerial practices underlying ambidexterity still remain elusive. Many of the forms of inputs still remain relatively broad (indeed, Im and Rai (2008) use contextual ambidexterity as an input to knowledge-sharing performance), and there is still limited understanding of the *enablers* of ambidexterity. In their paper, Gibson and Birkinshaw (2004) offer some insight into this, identifying the performance management and social contexts as antecedents. However, this is relatively limited

lens through which to analyse the details of the organisational ‘input’ mechanisms. It is also significant that the studies do not focus on the nature and utilisation of *resources* as inputs, and so this is underexplored.

### 2.6.10 The Nature of ‘Inputs’

Given the complicated nature of ambidextrous organisations, it is not clear that there is a straightforward way in which to address the nature of ‘inputs’. The papers highlighted above do not tackle this in terms of the organisational resources, and this is a key concern. A framework is required by which we can understand a wide range of organisational assets and resources which may be drawn upon to enable ambidextrous processes (i.e. exploitation and exploration). As mentioned in section 2.6.3, a more detailed understanding can be obtained by considering these resources in terms of *organisational knowledge*, and specifically *intellectual capital* (IC). This argument has been put forward by Kang and Snell (2009) who use these concepts, and this will be utilised in this work and discussed in detail in the next section.

The input-process-output view can therefore be utilised by consideration of these organisational resources as inputs – an approach not taken by the studies in Table 5. This offers insight into how *knowledge assets* (here, intellectual capital) can enable ambidexterity, and the link between ambidexterity and organisational performance. This is both an underexplored area of empirical research and a potentially valuable area for practitioners.

The input-process-output concept is powerful and appropriate in many contexts, yet a certain amount of care must be taken in using such a model. Ilgen et al. (2005) note that it presupposes a linear system, and does not explicitly capture feedback loops and wider dynamic issues. The output may feed back to become the next input, and they propose the conceptualisation of the *input-mediator-output-input* (IMOI) model to highlight potential cyclical causal feedback. Whilst it is beyond the scope of this work to use an IMOI model, the limitations of the input-process-output model are acknowledged.

## 2.7 Ambidexterity and Intellectual Capital

Simsek et al. (2009:888) acknowledge that “[i]t is simply not known how business units or small organizations simultaneously attain exploitation and exploration. Given their lack of slack resources, we surmise that intellectual capital resources might be the foundation for ambidexterity in independent units”.

This section considers how knowledge (specifically, intellectual capital) can be understood as an enabler of ambidexterity, and this is discussed in generic terms to highlight key literature and develop theoretical arguments.

### 2.7.1 Knowledge and Intellectual Capital - Overview

If we understand ambidexterity as a process leading to an output, we can consider as inputs to that process the idea of the organisation’s knowledge assets. This is the approach offered by Kang and Snell (2009). The initial theoretical basis to be used is that of the resource-based view (RBV) of the firm (Barney, 1991; Wernerfelt, 1984). This argument contends that a firm’s competitive advantage is derived from the bundle of valuable resources under its control.

Some scholars argue for organisational knowledge as a theory of the firm (Grant, 1996; Harris, 2001; Liebeskind, 1996; Spender, 1996), in line with RBV. However, defining ‘knowledge’ is itself difficult. Davenport and Prusak (1998:5) write that “Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers. In organisations, it often becomes embedded not only in documents or repositories, but also in organisational routines, practices, processes and norms.” This is in line with Tsoukas and Mylonopoulos (2004:2), who argue that “A firm that has developed the *capability* to integrate, communicate and create knowledge on an ongoing basis is a *learning* firm, whose *knowledge assets*, by virtue of being inextricably embedded into its historically developed context, are idiosyncratically complex and dynamic and, thus, unique.” (emphasis in original). This is therefore a complex construct to understand (Huber, 1991; Tsoukas, 2005), existing on multiple levels.

It is important to understand the classification of different forms of knowledge. The tacit / explicit distinction of Polanyi (1966) and Saint-Onge (1996) is vital in our understanding. *Explicit*, or codified, knowledge is that which is transmittable in formal language. It is the ‘know-what’ (Blackler, 1995; Nonaka, 1994; Ryle, 1949). Similarly, *tacit* knowledge is the ‘know-how’, which is personal, hard to communicate and rooted in action. Spender (1996) identifies that tacit and explicit knowledge can exist at both the individual and organisational level. Nonaka (1994) contends that both forms are necessary, and the interplay of the two leads to the growth of organisational knowledge through the SECI (socialisation, externalisation, combination and internalisation) model, although some scholars query this interpretation (e.g. Gourlay, 2006).

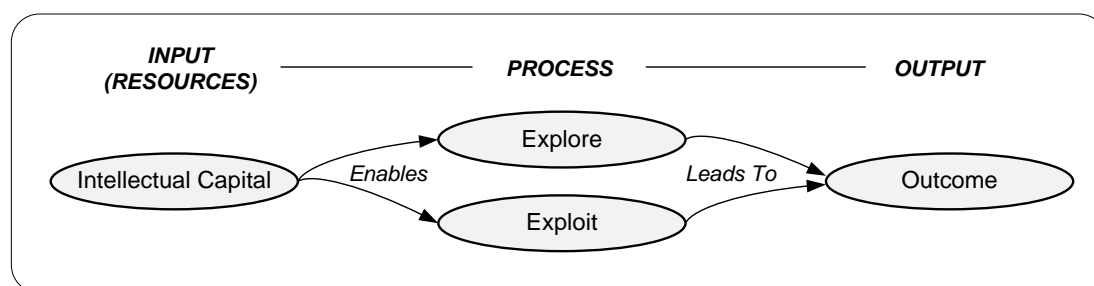
Researchers have developed a classification system to better understand specific organisational knowledge in more detailed terms, that of (as mentioned) intellectual capital. This can be considered in terms of knowledge *stocks* (Dierickx and Cool, 1989; Kang and Snell, 2009; Starbuck, 1992), whereas learning is more associated with the *flow* of that knowledge (Bontis et al., 2002; Crossan et al., 1999).

IC is a broadly defined term, with many interpretations, and essentially is an extension of the RBV. From a broad perspective, Stewart (1998:67) frames the context of the IC discussion usefully, describing it as “knowledge that exists in an organization that can be used to create differential advantage”. Bontis (1998:95) defines IC as “the stock of knowledge in the firm”, although advises that “the most precious knowledge in an organisation often cannot be passed on” (1998:95). Rastogi (2002) writes that IC is the firm’s ability to overcome challenges and exploit opportunities, whereas Youndt et al. (2004:337) describe it as “the sum of all knowledge and knowing capabilities that can be utilized to give a company competitive advantage.” Petty and Guthrie (2000) understand IC as only the sum of human and structural capital (discussed shortly), whereas Chan (2009:5) rather cryptically, defines IC as “knowledge about knowledge”. Numerous IC measurement techniques have been proposed (such as Edvinsson, 1997; Marr et al., 2004; Sveiby, 2007), and studies have been performed showing the link between IC and organisational performance (Bontis et al., 2002; Subramaniam and Youndt, 2005; Youndt et al., 2004).

These concepts can now be brought together in the simple model of Figure 17. This uses the input-process-output model of ambidexterity (Simsek, 2009) with the consideration of intellectual capital as the enabler of the exploitative and exploratory processes (Kang, 2006; Kang and Snell, 2009). Note that the use of the term

'enable' indicates that the intellectual capital underpins the exploratory and exploitative attainments, and that the processes occur within a structure of IC.

This is a generic model to link the knowledge assets (resources) of an organisation (in terms of its intellectual capital) as inputs, such that these may enable ambidexterity, which leads to performance outcomes. This is context-independent, so terms such as 'performance outcomes' are not as yet specifically defined. Importantly, the managerial practices by which these outcomes are achieved are also not yet within the model, and these are introduced later. At this point, a simple I-P-O structure is considered.



**Figure 17: Generic Model of Ambidexterity**

As discussed, scholars have not as yet fully linked these inputs and processes in this way to an evaluation of organisational performance. Indeed, Raisch and Birkinshaw (2008) argue that the complexity of the organisational *ambidexterity – performance* linkage has not been addressed, and this work may aid in that search. This represents a valuable research gap.

IC can be broken into multiple subcomponents (see Swart, 2006, for a detailed review), and for the purposes of this research they will be classified in terms of *human capital* (HC), *social capital* (SC) and *organisational capital* (OC). Note that the literature recognises *organisational capital*, but in the context of the work bounded by the project (as studied in the research phases), the concept of *project capital* will later be developed and used.

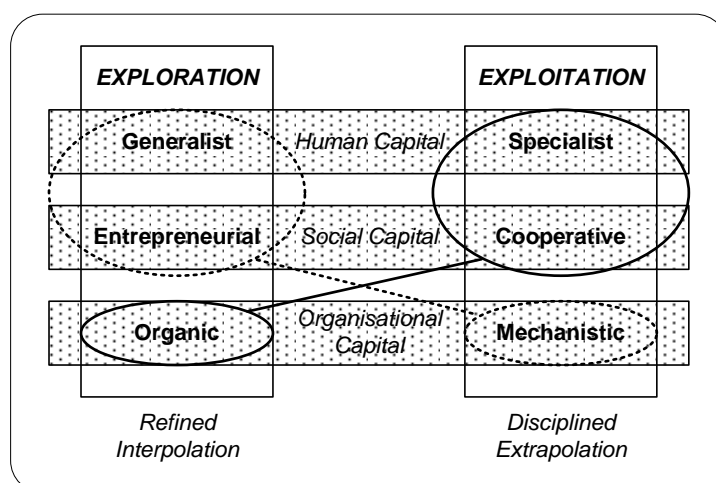
### 2.7.2 Human Capital and the IC Framework

A long line of debate within the organisational learning literature has taken place regarding the location of learning, and a search in peer-reviewed journals on EBSCO (May 2011) for 'human capital' returned 10,584 responses.

Hayek (1945) identified that knowledge is distributed within the minds of individuals, as did Hedberg (1981). Simon (1991:125) argued that "All learning takes place inside human heads; an organization learns in only two ways: (a) by the learning of its members, or (b) by ingesting new members who have knowledge the organization didn't previously have." Bontis (1998:65) writes that "The essence of human capital is the sheer intelligence of the organizational member." This is the sum of the training, experience, intellect and ability of the individuals. Stewart (1998:76) describes it as "the capabilities of the individuals required to provide solutions to customers." This can also include firm- or industry-specific knowledge (Dierickx and Cool, 1989; Swart, 2006). However, much of this HC is tacit, 'sticky' (Szulanski, 1996; Von Hippel, 1994) and difficult to transfer. Davenport (2005) shows that the increasing significance of 'knowledge workers' also makes the management task more difficult, and practitioners are warned of the dangers of losing key knowledge embedded in staff (Leonard and Swap, 2004).



In terms of human capital ambidexterity, the work of Gibson and Birkinshaw (2004) has shown that contextual ambidexterity can be facilitated by individuals. However, Kang and Snell (2009) develop the framework of Figure 18, whereby they consider the three major forms of IC (human capital, social capital and organisational capital – SC and OC to be discussed shortly) in terms of exploitative and exploratory factors.



**Figure 18: Ambidextrous Architectures (Kang and Snell, 2009)**

Looking at human capital, they advise that generalist HC is more associated with exploratory learning, and specialist HC is more associated with exploitative learning. They further build this argument into advocating two distinct *ambidextrous architectures* (highlighted in Figure 18). The SC and OC arguments will be developed in the next sections, but the model proposes two distinct architectural forms: *refined interpolation* requires specialist HC, cooperative SC and organic OC, whereas *disciplined extrapolation* utilises generalist HC, entrepreneurial SC and mechanistic OC. This can also be compared to Birkinshaw and Gibson's (2004) work which highlights that structural ambidexterity can best be achieved by more specialist staff with more tightly-defined roles where the senior management team define the structure, whereas contextual ambidexterity is facilitated most effectively by more general staff with the flexibility to make appropriate decisions.

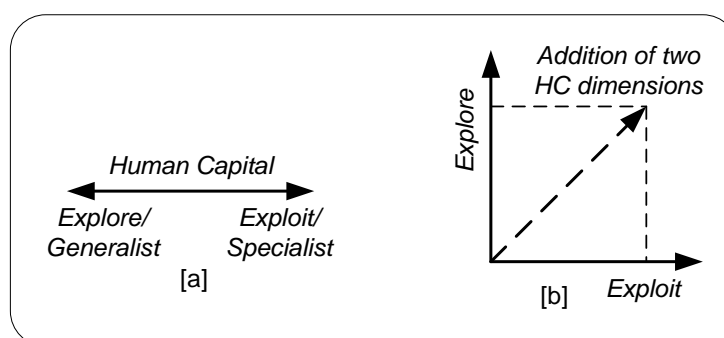
The architectural view of Kang and Snell (2009) offers insight into how organisations may organise themselves so as to enable ambidexterity. Empirical work to test this in law firms (Kang, 2006) has shown the positive effect of generalist HC on exploration and mechanistic OC on exploitation, and also the benefit of internal SC on both exploitation and exploration (Note that SC and OC will be discussed in the next two sections).

Additionally, a quantitative study by Youndt et al. (2004) showed that levels of IC corresponded positively with high performance (see also Reed et al., 2006), although most firms concentrate on one aspect only. They also show (Subramaniam and Youndt, 2005) that OC supports incremental innovations, whilst the combination of SC and HC support radical innovations. They write (2005:459) that "social capital may be the key not only for creating ambidextrous organizations...but also for developing 'dynamic capabilities' that enable organizations to shift their competitive focus and achieve new forms of competitive advantage."

Given the nature of many organisations, an alternative re-conceptualisation of this architectural model may be envisaged. Firstly, considering the human capital element, Kang and Snell (2009) distinguish between generalists and specialists to create one of two architectural solutions (Figure 18). However, this is at odds with many firms and organisations, which are often multidisciplinary, consisting of both generalist and specialists who need coordination in order to be productive (Sheremata, 2000). Along similar lines, Rigby et al. (2009) advocate complementary left-brained and right-brained thinkers to generate creative innovation, and Matzler et al. (2007) emphasise the role of skilled intuition and pattern-recognition in decision-making. The balance of both exploratory and exploitative capability is entirely in line with the concept of contextual ambidexterity (developed by Gibson and Birkinshaw, 2004), and is also supported by the concept of 'T-shaped' staff (Hansen and von Oetinger, 2001) where the horizontal aspect of the 'T' represents general domain knowledge, and the vertical line is deep, specialised, expertise. Management of such skilled knowledge workers is difficult, though, and von Nordenflycht (2010) refers to this as 'cat-herding' within professional service firms.

Referring back to Figure 18, Kang and Snell (2009) represent architectural solutions consisting of combining either generalist or specialist HC to produce an organisational architecture appropriate for the context. Although their work was from an HR perspective, their framework provides interesting possibilities for examining the execution of complex work. For multi-disciplinary organisations, it is most often the case that there are many heterogeneous participants. To produce ambidexterity, *both* forms of HC are likely to be necessary (i.e. a range of specialists, but with generalists having some familiarity with those specialities). Note that this is a generic proposal, and the operationalisation of the argument is discussed in greater detail later.

Therefore I propose that the benefits of human capital to the organisational outcomes can be as shown in Figure 19. Choosing one of the forms of HC in Figure 18 implies that there is a trade-off in the decision when applied to one of two architectural choices, and that one is preferential over another under particular circumstances. Whilst this is a powerful argument in terms of architectural design, it tends towards the conception of HC for a particular firm as a unidimensional construct, as in Figure 19[a]. However, considering the application in a complicated organisational structure, I conceive of it as two orthogonal dimensions, as in [b]. They are not mutually exclusive. This is also in line with the argument of ambidexterity itself being orthogonal (Gupta et al., 2006), and as such it follows that the subcomponents of ambidexterity can also have a consistent representation. Drawing on the work of Kang and Snell (2009), I believe that this is a step forward in theorising, understanding and conceptualising ambidexterity when considered within a complicated organisational environment.



**Figure 19: Orthogonality of Human Capital Ambidexterity**

Thus I propose that generalist human capital enables exploration, specialist human capital enables exploitation, and, based on the model of Figure 17, the combination of both generalist and specialist human capital can enable ambidexterity. This will be discussed further with regard to the detail of the research undertaken.

### 2.7.3 Social Capital

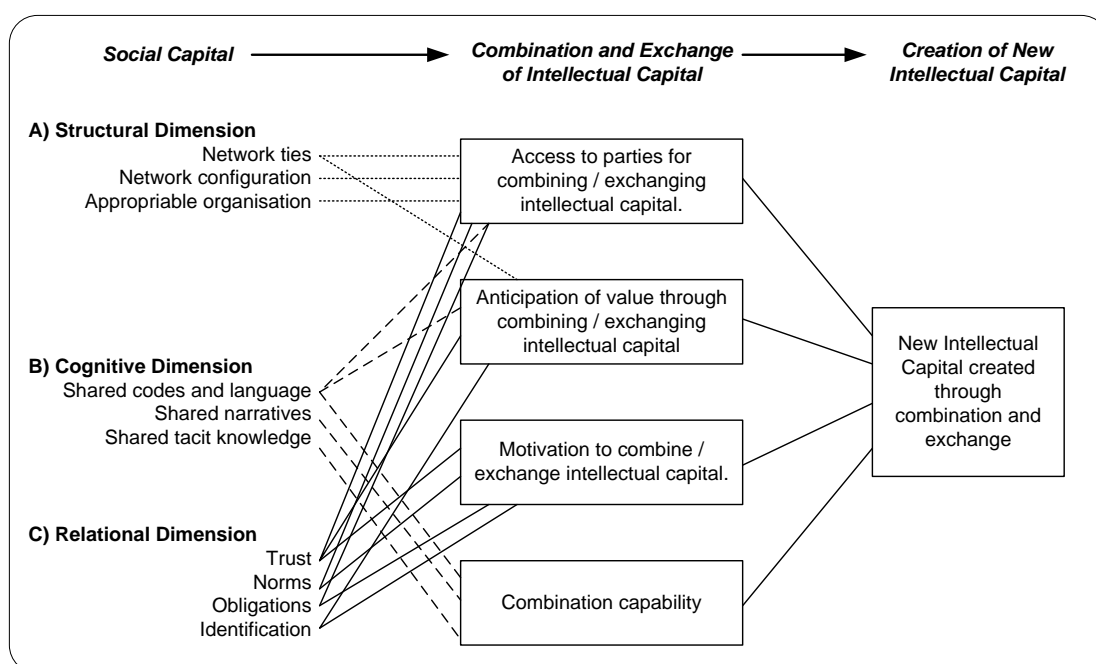
There is a significant volume of literature on *social capital* (SC). A search in peer-reviewed journals on EBSCO (May 2011) returned 2895 responses. As an area of research, it covers a wide range of investigation, and has multiple interpretations. The issues of social capital are explored in a review by Lee (2009).

Andriessen and Gubbins (2009) identify it in terms of *relationships* considered as contacts, links, ties, connections, paths, networks, channels, resources and capital. Inkpen and Tsang (2005:151) define social capital as “the aggregate of resources embedded within, available through, and derived from the network of relationships possessed by an individual or organisation”. Cohen and Prusak (2001:4) describe it as “the stock of active connections among people: the trust, mutual understanding and shared values and behaviours that bind the members of human networks and communities and make cooperative action possible.” Different structures and roles and ‘scripts’ have been identified in this context (Fournier and Lee, 2009). Similarly, Oh et al. (2006:569) consider it as “a set of resources that inheres in the structure of relations of individual actors”. Adler and Kwon (2002:17) advise that SC can be understood as “the goodwill that is engendered by the fabric of social relations and that can be mobilized to facilitate action”, and Leana and van Buren (1999:583) write that “Organizational social capital is realized through members’ levels of collective goal orientation and shared trust” (see also O’Toole and Bennis, 2009). However, this can be significantly damaged by antisocial and toxic colleagues who can significantly degrade organisational performance (Porath and Pearson, 2009). Pauleen (2007) argues that ideas can take time to incubate and develop, and anti-social behaviours can be a defence mechanism for generating the required time. He identifies the inherent paradoxes of managing some creative staff, in that the requirements of the social/anti-social and formal/informal nature of some individuals and teams needs to be managed in order to generate results.

The social context is important in enabling knowledge capture, transfer and learning, and the community-based approach must be appreciated (Bresnen et al., 2003) and can be managed strategically (McDermott and Archibald, 2010). Social trust is a key enabler of interaction within and between teams during the innovation processes (Chowdhury, 2005; Clegg et al., 2002; Jassawalla and Sashittal, 1999; Kamoche and Pina, 2001; Madhavan and Grover, 1998; Rouse, 1999; Spender, 1996). This requires management action to build such an environment.

Kogut and Zander (1992; 1996) propose that the firm can be understood as a social community specialising in the creation and transfer of knowledge, and SC is the mechanism whereby the effectiveness of group knowledge is generated, and this is supported by Granovetter (1992). Kilduff and Tsai (2003:28) observe that social capital is different from financial capital in that “actors do not control their social capital in the same way they control their money or their human capital. To use social capital, it is necessary to draw upon the cooperation of another actor by, for example, asking for advice or help at work.” This is also explored by Brown and Duguid (2000). Stewart (1998:163) writes that to create HC it can use, a company needs to foster teamwork, communities of practice and other social forms of learning, inferring that there is an inherent need for social capital to enable HC.

Nahapiet and Ghoshal (1997; 1998) offer a model with three key dimensions of SC that enable the combination and exchange of intellectual capital. The three dimensions are *structural*, *cognitive* and *relational*. The structural dimension covers the social network, and also how transferable the SC is between contexts. It is interesting to compare this to Adler and Kwon's (2002) discussion of social relations requiring the three aspects of opportunity, motivation and ability to be valuable. The cognitive dimension refers to the resources providing shared language and systems of meaning amongst participants. Interestingly, in the 1997 model (shown in Figure 20), the cognitive dimension includes the function of shared tacit knowledge, whereas this is missing in the 1998 model. It is included here as an element that may be important in the research. The later model, though, includes a feedback path from the final box into the SC section. The final element is the relational dimension, encompassing trust and group norms of interaction.



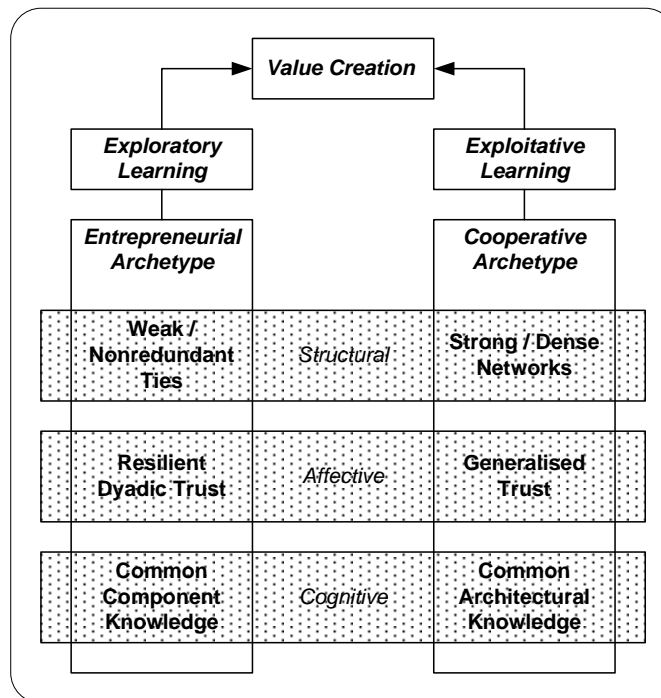
**Figure 20: Social Capital Model (Nahapiet and Ghoshal, 1997)**

The role of social networks has been increasingly identified as a rich area of research (Burt, 1992; Kilduff and Tsai, 2003; Kilduff et al., 2006), since this is important in achieving business objectives (Cross and Prusak, 2002; Prusak and Cohen, 2001). Complex and ambiguous problems are aided by this, and Cross et al. (2001) cite evidence that engineers and scientists are roughly five times as likely to turn to another person than to an impersonal source such as a database. They identify that effective sharing is promoted by (1) knowledge, (2) access, (3) engagement and (4) safety.

Tie strength and network density (Granovetter, 1973; Granovetter, 2005) have been shown to influence knowledge transfer, and Hansen (1999) showed that strong ties are conducive to transferring complex knowledge, whilst weak ties are powerful in searching for new knowledge. Reagans and McEvily (2003) expand this argument to include social cohesion and network range as important factors in knowledge transfer, and Leonard and Sensiper (1998) highlight that social interaction can be important in creativity and innovation. Indeed, Kleinbaum and Tushman (2008) recommend encouraging informal social networks to foster innovation, and even promoting boundary spanners based on their social networks, not just their skills and experience. Vermeulen et al. (2010) also argue that over time, informal

networks can mirror the formal organisational structure, strengthening silos, and restructuring may help ‘shake things up’ to improve collaboration. However, leaders must also establish that the team should learn from their activities in an environment of psychological safety (Edmondson et al., 2001).

Referring back to Figure 18, Kang and Snell (2009) distinguish between *cooperative* SC and *entrepreneurial* SC, for exploitative and exploratory learning, respectively. Expanding this, Kang et al. (2007) consider how the structural, affective and cognitive elements (Nahapiet and Ghoshal, 1998) can be considered in terms of their exploratory and exploitative learning elements (Figure 21).



**Figure 21: Ambidextrous SC Architecture (Kang et al., 2007)**

Firstly, the structural aspect of social capital incorporates weak and non-redundant ties, associated with the entrepreneurial archetype and exploratory learning. Within Figure 18, ambidexterity can be achieved by linking weaker ties with generalist human capital, with the premise that the sparser network is more powerful at connecting to new knowledge, in line with Burt (1992) and Granovetter (1973). The alternative is that strong, dense, redundant connections of specialists are more beneficial at deepening expertise (Uzzi, 1997). Güttel et al. (2009) cite evidence of an R&D organisation where the exploratory unit deliberately seeks high staff turnover to access new information and avoid stagnation, whilst the exploitative unit consisted of mainly core staff with more defined career paths.

Considering again the concepts highlighted in Figure 19 for HC, a similar line of argument can be applied to SC. It is not necessarily the case that the forms of SC be *either* exploitative *or* exploratory, they need not be mutually inconsistent. Consider, for example, the case of a technical product development group with close ties of specialists, but also weaker links to other departments within the firm, outside suppliers, and so forth. These ties need to be managed appropriately, though. For example, Pisano and Shih (2009) assert that outsourcing the manufacturing function weakens the R&D / manufacturing links, thereby weakening R&D capability itself, since these functions benefit by greater connectedness.

Tiwana's (2008) argument for a 'portfolio of ties' enhances the 'connectedness' within the boundary of the organisation under consideration. Interestingly, Sheremata (2000:399) proposes that: "Connectedness in problem solving speeds the problem solving process, increases resource expenditures in the problem-solving process, and increases the quality of tradeoff decisions", and this is in line with the concept that ambidexterity may not be the most efficient architecture in the short term, but, crucially, the complexity of its structure enables longer-term advantage. Bahemia and Squire (2010) theorise that this can also be managed to enhance open innovation. I argue therefore that weak *and* dense networks can be mutually reinforcing in this context, and this argument is consistent with the work of Tiwana (2008) and Beckman (2006), discussed earlier.

Within Figure 21, similar arguments can be applied to the affective and cognitive dimensions. Kang et al. (2007) distinguish between *generalised trust*, which refers to impersonal or institutional trust between members of a social unit, and *resilient dyadic trust*, which refers to trust between two parties having direct experience with each other. Within a project context, it is reasonable to imagine that an individual or team could build both generalised trust with team members, but also resilient dyadic trust with other individuals, departments or teams. This requires skill to develop, and personal traits are important. Pentland (2010), for example, argues that charisma is powerful, and highlights that social interaction skills indicate how well business pitches are received, irrespective of the quality of the actual ideas.

The third aspect is that of the cognitive dimension, which "highlights the importance of shared representation, understanding, and systems of meaning needed for organizational learning" (Kang et al., 2007:240). They argue that common architectural knowledge (see Henderson and Clark, 1990; Henderson and Cockburn, 1994) is powerful in allowing heterogeneous parties to understand the larger picture of their work environment, and integrate their work with others, even if co-workers have different specialities. Common component knowledge is when employees know enough about the content domain of another's expertise to be able to assimilate and apply it. This aids in exploratory learning (Kang et al., 2007). Once more, it is straightforward to envisage how, for example, a development team may be able to incorporate a supplier's new technology into their product design (Cohen and Levinthal, 1990), and so these two cognitive dimensions can be represented as complementary, and considered as orthogonal also.

It is therefore reasonable that the argument for HC be extended to SC also, since social values and norms can enable contextual ambidexterity (Güttel and Konlechner, 2009). Ambidexterity within a complicated organisational structure can therefore be considered both in terms of the exploratory and exploitative domains, in line with Kang and Snell (2009). I therefore propose that 'entrepreneurial' social capital enables exploration, 'cooperative' social capital enables exploitation, and the combination of these two elements can enable ambidexterity.

This argument follows the HC logic of Figure 19, in that SC can also be understood not as a continuum but as two orthogonal dimensions. Put simply, the combination of both dimensions can be greater than that of a single dimension.

#### 2.7.4 Organisational Capital

At the organisational level, scholars distinguish between *structural capital* (STC) and *organisational capital* (OC) (Swart, 2006). STC consists of the informal or tacit routines, formal and explicit procedures, processes for internal organisation and external relationships which can be thought of as "organisational know-how" (Swart,

2006:148). As Daft and Weick (1984:285) argue: “Individuals come and go, but organizations preserve knowledge, behaviors, mental maps, norms, and values over time”, whilst Holmqvist (2009:278) writes that “[o]rganizations learn by encoding inferences from experience into organizational routines, standard operating procedures and other ‘organizational rules.’”

Bontis (1998:66) writes that STC “deals with the mechanisms and structures of the organisation that can help support it in their quest for optimum intellectual performance and therefore overall business performance.” Stewart (1998:108) describes it as “knowledge that doesn’t go home at night.” He expands upon this (1998:163) “Structural capital serves two purposes, to amass stockpiles of knowledge ... and to speed the flow of that information within the company.” Teece (1998) writes that if the knowledge of professionals is kept personal and not shared, then the firm can, at best, obtain returns to scale, and will possibly suffer bureaucratic burdens. However, Malhotra (2009) advises that excessive codification in contractual conditions can undermine trust by preventing displays of good intentions to build relationships, potentially indicating a trade-off with the role of social capital.

OC is the knowledge embedded in the technology and processes used (Swart, 2006). The wider literature does not make a clear distinction between this and structural capital, so for the purposes of this work, this distinction will not be made, and organisational processes and structure will be referred to at this stage generically as OC (Kang and Snell, 2009; Subramaniam and Youndt, 2005). This level of analysis in the knowledge domain can be compared to the ‘routines and activities’ thinking in the organisational learning school back in Figure 7, since this organisational level of consideration is where learning is captured outside of the minds of individuals.

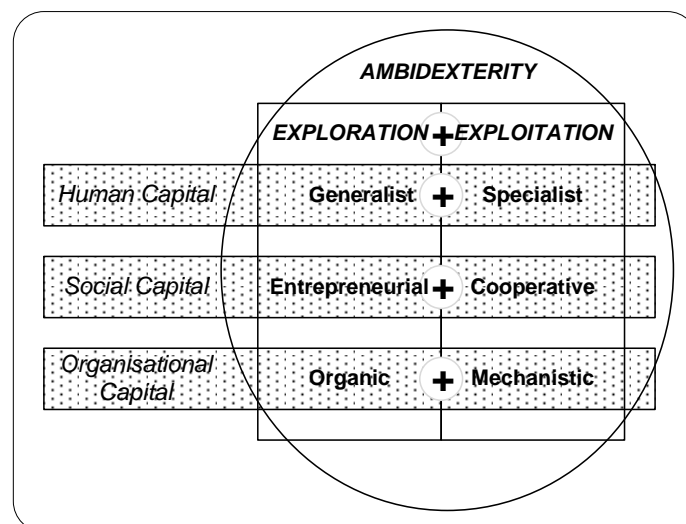
The role of organisational capital can be developed in a similar way to that of HC and SC. Kang and Snell (2009) argue that this construct can be understood as an *organic* or *mechanistic* configuration (Burns and Stalker, 1961). However, to conceive of organisations as either autonomous, flexible and experimental, or rigid prescribed and rule-following, neglects the option for both of these forms to be balanced. Rules and procedures can act as a framework in which new knowledge is created, and in situations where the solutions to problems are not immediately apparent, this can readily be envisaged. This argument is supported by Brown and Eisenhardt (1997), who identify how successful product innovation organisations balance limited structure with improvisation, and Lindkvist and Soderlund (1998) who emphasise the balance between creative knowledge generation and task deadlines. In discussing ambidexterity, Visscher and De Weerd-Nederhof (2006) argue that uncertain situations demand ‘bricolage’, the ability to improvise with the resources at hand, since the value of planning is limited. Simsek (2009:603) supports the simultaneity, arguing that “their joint pursuit should enhance performance by enabling an organization to be innovative, flexible, and effective without losing the benefits of stability, routinization, and efficiency.”

From this discussion, and in line with the arguments for HC and SC, the following further arguments can be developed: organic organisational capital enables exploration, mechanistic organisational capital enables exploitation, and the combination of both organic and mechanistic organisation capital can enable ambidexterity. Again, a consideration of the organic-mechanistic ideas as a continuum can limit our understanding. The idea of both existing within the organisation enables a better perception of how ambidexterity can exist in a practical, complicated, environment.

### 2.7.5 Intellectual Capital and Ambidexterity

How can this analysis be applied within the complicated organisational settings? In terms of organisational theory, Simsek (2009) argues that complex, turbulent, environments demand greater levels of ambidexterity, and centrality and diversity enhance the organisation's ability to develop ambidextrous responses. This enhances the level of fit with the environment as well as improving strategic flexibility. Considering the heterogeneous elements and complex structure of many organisations, this is an important consideration. Given the nature of many firms' practical operation, it is intended that exploration and exploitation are conceptualised as orthogonal, as argued previously, and that ambidexterity is understood as both occurring. It is not intended that they be understood as opposite ends of a continuum, since a unidirectional construct assumes a single domain (discussed by Gupta et al., 2006). In line with a multi-domain analysis, it is assumed that manifold functional elements within the boundary of the organisation are instrumental in work execution, and that there will be a level of interconnectedness to achieve this.

The argument therefore draws upon the work of Kang and colleagues (Kang and Snell, 2009; Kang et al., 2007), amongst other authors, yet also diverges from their conceptual model of how ambidexterity may be achieved. Whilst they offer architectures and choices in terms of how to construct an ambidextrous organisation, I propose that the simultaneous pursuit of both exploration and exploitation at the human, social and organisational capital levels can lead to superior performance. Put simply, Kang et al. (2009) propose that ambidexterity can be managed by designing an organisation with the appropriate *three of six* factors, whereas I propose that *all six* may be required in the (generic) context of a complicated organisation that has been discussed. This is shown in Figure 22, which highlights that to achieve ambidexterity (i.e. exploration together with exploitation) then this should be replicated within the intellectual capital elements that are proposed as the enablers. By considering each IC domain as an orthogonal construct, an organisation need not necessarily trade off one tendency for another.

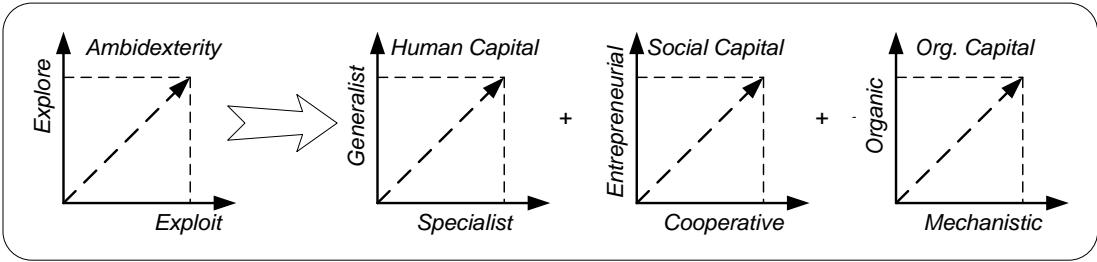


**Figure 22: Ambidexterity Model**

This can also be represented as in Figure 23, which shows how organisational ambidexterity can be considered in terms of orthogonal subcomponents. Theoretical

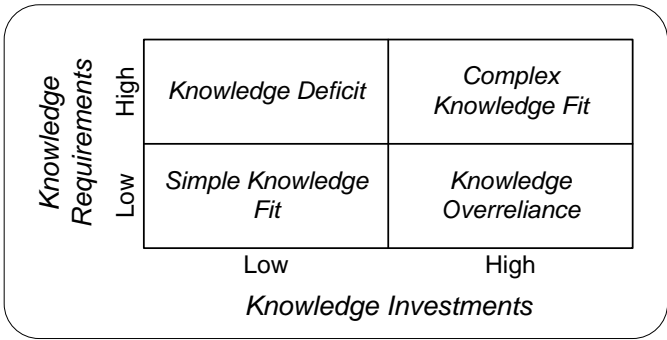


arguments have been developed for how this may be the case in a complicated, practical, environment.



**Figure 23: Subcomponents of Ambidexterity**

The question that this raises is why this theoretical framework is different from that developed by Kang et al. (2009), as reflected back in Figure 18. To develop an understanding of why this may be the case, it is insightful to attempt to classify the complexity of the organisation under consideration. Reus et al. (2009) provide a simple framework for considering and matching the complexity of knowledge investments and that of the knowledge requirements (Figure 24). This is achieved by consideration of environmental complexity and dynamism, task complexity and analysability, internal and external uncertainty and equivocality (the existence of multiple and conflicting meanings about situations), along with internal and external information and know-how acquisition and transfer.



**Figure 24: Knowledge Investments (Reus et al., 2009)**

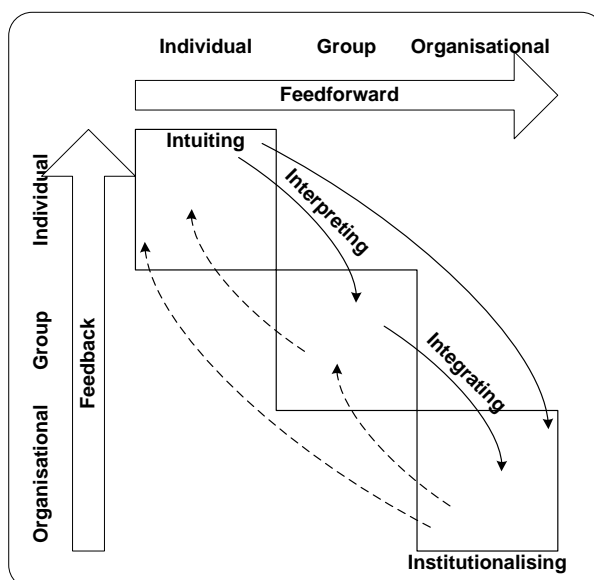
I argue that the many practical organisations can represent *complex knowledge fit* in Figure 24, and that, given the multiple factors that need to be accommodated in this concept, the refined interpolation or disciplined extrapolation model of Figure 18 may be insufficient. I propose that these can represent complex environments and organisational structures, and that utilising one of two ambidextrous architectures may not be sufficient to enable organisational success. However, potentially, in a less complex environment (for example, a functional department with relatively homogeneous staff, within a large and relatively stable organisation), this may represent a more *simple knowledge fit* in Figure 24, in which case a more defined architecture may be more suitable.

The inclusion of the terminology of complexity, though, is consistent with Simsek (2009) who introduces environmental complexity into the ambidexterity argument, characterising it as an environment with a “wide array of customers, competitors, and diversity in the type of marketing and production methods needed to cater to the different segments of a market” (2009:617). His reasoning is that when complexity is low, organisations can improve their existing systems to increase their efficiency, whereas under conditions of high complexity, a simplistic strategic pursuit may be ineffective. He therefore suggests that organisational ambidexterity is more

beneficial in complex environments, and this complexity argument is pursued further in section 2.8.3 in the context of the specific research environment.

## 2.7.6 Interaction of IC Elements

Whilst these intellectual capital elements can be considered separately, it is in their interaction that much of organisational value is developed. Crossan et al. (1999) show that these can be examined together, in the context of organisational renewal, and propose the cyclical '4I' model (Figure 25) that spans individual, group and organisational learning levels. The model incorporates a link between these and the explore/exploit terminology of March (1991). Specifically, "Feed forward relates to exploration. It is the transference of learning from individuals and groups through to the learning that becomes embedded - or institutionalized - in the form of systems, structures, strategies, and procedure... Feedback relates to exploitation and to the way in which institutionalized learning affects individuals and groups." (Crossan et al., 1999:524). This model has been expanded upon, with Lawrence et al. (2005) considering the effects of power and politics. Additionally, Litchfield and Gentry (2010) also argue that perspective-taking should be raised from individual- to organisation-level, and this can aid in ambidexterity.



**Figure 25: 4I Dynamic Learning Model (Crossan et al., 1999)**

Crossan et al. (1999) identify how the exploration and exploitation learning paths are distinguished, and the language is consistent with the previous discussion. "Expert intuition supports exploitation; entrepreneurial intuition supports exploration. Entrepreneurial intuiting generates new insights." (Crossan et al., 1999:526). The research by Bontis et al. (2002) using this model identified a positive relationship between stocks of knowledge at all levels and organisational performance, and that misalignment of stocks and flows was negatively associated with performance. This is also in line with Tsoukas and Mylonopoulos (2004:2), who argue that "organizational knowledge, learning and capabilities form a triangle: the ongoing development of organizational knowledge is, or can be, a dynamic capability that leads to continuous organizational learning and further development of knowledge assets."

This model is effective in showing how organisational learning can occur, but it can also be a powerful tool for assessing where the linkages are broken or ineffective.

Schilling and Kluge (2009) identify the multiple factors that can prevent the processes identified, and given the difficulties in creating a learning organisation, this is a valuable contribution.

In summary, this is an important construct, as it captures not only the static aspects of knowledge, but also the dynamic interplay and circularity of the feed-forward and feed-back paths that characterise organisational learning. It highlights the concept that the levels of analysis may be interdependent, and that this is an area to investigate. Compartmentalising the levels may be insufficient to fully understand organisational learning, since the knowledge circulates amongst the levels (Gherardi, 2001; Youndt et al., 2004). However, since the model highlights the feedback processes of learning, the limitations of the linear the input-process-output model must again be acknowledged (Ilgen et al., 2005).

## 2.7.7 Multi-Level Linkage of IC to the Ambidexterity Literature

The literature review so far has covered the material on ambidexterity, and also an overview and theoretical discussion of intellectual capital as an ‘input’ to enable exploitation and exploration. These were both considered at multiple levels, and the concepts can be combined as shown in Table 6 below. This synthesises an understanding of how the empirical data (summarised back in Table 3) can be reflected in terms of inputs and multi-level actions. This presents a framework offering a clearer understanding of ‘what is going on’ in the attainment of ambidexterity which is not evident from individual studies.

**Table 6: Multi-Level Inputs and Mechanisms**

Intellectual Capital Resources as Inputs			
Actions / Mechanisms at Each Level			
	Organisational Capital	Social Capital	Human Capital
	Structural configuration and separation, inter-organisational relationships, capacity for change.	Systems to share values and goals. Working groups allowed autonomy and flexibility.	Operational flexibility for managerial discretion and judgement
	Structured, cross-functional, teams. Reward systems to support ambidexterity. Formal and informal operating systems.	Complex network of relationships for effective knowledge-sharing. Environment supporting learning. Stretch, discipline, support, trust.	Managerial ability to promote flexibility, values and norms within the group.
Individual	Multiple cross-functional interfaces to accommodate formal and informal coordination.	Leaders must focus both on achieving tasks whilst building strong team relationships.	Managerial vision and behavioural adaptability. Formal and informal coordination and communication.

However, it is not clear that the interactions of these IC inputs, nor their practical operationalisation to achieve ambidexterity, are completely understood.

## 2.7.8 Literature Summary

The systematic literature review highlighted the theoretical underpinnings of ambidexterity, and the results of the empirical studies to date. From this I showed that the majority of studies have been at the organisational level, and whilst the benefits of ambidexterity have been shown (generally in the form of financial performance), the underlying mechanisms enabling this are less clear. Essentially, the ‘what’ is understood better than the ‘how’, especially in complicated organisational structures incorporating multiple heterogeneous elements. The ‘what’

has been primarily investigated using quantitative methods, and the ‘how’ may be best served by a more detailed qualitative study.

As highlighted back in Figure 16, the empirical data is limited at the group and individual level when compared to the organisational level. The role of the manager is also poorly understood, and the identification of specific managerial practices (explaining the ‘how’) is lacking within the literature, and therefore this is an area likely to benefit from further research.

**Areas of Value:**

- 1) **Qualitative investigation to better understand the ‘how’**
- 2) **Focus on managerial practices to understand how ambidexterity is enabled.**

To better understand ambidexterity, a limited number of studies have used an *input-process-output* investigative model, although these have generally been at the organisational level and there has been little at the individual managerial level. To address the issue of understanding the inputs, an intellectual capital approach was presented which allows the organisational knowledge assets to be identified at multiple levels. By considering the human, social and organisational capital as orthogonal (in line with ambidexterity theory), this builds on and extends current theory, and allows a more detailed understanding of how ambidexterity may be enabled. The simple research model from this review is therefore represented in Table 7, based on the diagram of Figure 17 shown earlier.

**Table 7: Initial Generic Research Model**

	<b><i>Input (Resources)</i></b>	<b><i>Process</i></b>	<b><i>Output</i></b>
<b><i>Defined as:</i></b>	<i>Intellectual Capital</i>	<i>Ambidexterity</i>	<i>Organisational Performance</i>
<b><i>Operationalised as:</i></b>	<i>Human Capital Social Capital Organisational Capital</i>	<i>Exploitation and Exploration.</i>	<i>Evaluation of performance.</i>

The argument to this point has, however, been generic, and has not been applied to any particular environment. In order to further investigate, a suitable research area is required. For this, I use the context of *the management of projects*, since this generally requires a mixture of tools and techniques (exploitative) together with an element of innovation to overcome project-specific issues (exploration).

Projects can be a relevant area in which to concentrate this work, since time-limited project groups have not been a major focus of research to date, and this is an under-theorised and under-investigated area. Whilst some studies have looked at organisations performing project-based work (such as R&D labs), the project as the level of analysis has not been the central focus. Raisch and Birkinshaw (2008), Lubatkin et al. (2006) and Gibson and Birkinshaw (2004) argue that structural ambidexterity may be more appropriate for large and diversified firms, whereas smaller or more focused firms may benefit more from leadership-based contextual ambidexterity. Smaller and focused firms may have fewer hierarchical levels and their top managers are thus more likely to play strategic and operational roles and address both exploitation and exploration. Conversely, large firms have many conflicting internal and external drivers, so contextual ambidexterity may be limited

to small firms and the business-unit level at larger firms. It is likely that contextual ambidexterity may be fostered at the project level, although the empirical evidence for this is low, at present. Raisch et al. (2009) argue that contextual ambidexterity has a dynamic component that has rarely been addressed, and this offers an important area of investigation in the project context also.

Project management potentially also offers another curious phenomenon – whereas much scholarly and practitioner management literature focuses on the need for exploration, in the form of innovation, in PM a significant issue is often the inability to exploit successfully, since lessons learned from, or even in, one project are often not transferred effectively (demonstrated by Brady and Davies, 2004; Davies and Brady, 2000; Williams, 2008). Thus PM may provide an important area of investigation in terms of ambidexterity, potentially exhibiting the opposite class of problem that is seen in other contexts. Therefore ambidexterity in PM represents not only an area with relatively low coverage within the literature, but may also give valuable insight into the wider issues of learning and innovation. Discussing ambidexterity, Visscher and De Weerd-Nederhof (2006:218) write that “[a]n organisational innovation journey can thus be defined as a continuous complex, contingent and uncertain process, in which organisational forms and technologies are shaped and reshaped to attain long-term survival.” This is an appropriate conception of complex projects, also, since viewing the execution as a exploitative, linear, process is often insufficient.

In summary the distinctive context of project organisations (specifically, time-bound and generally multi-domain and multi-level) make them an area suitable for investigation to address the theoretical research issues identified. The pertinent literature is now reviewed.

## 2.8 The Application to Project Management

The role of ambidexterity within the domain of projects is an important issue, as projects are increasingly being used within both the private and public sectors as a method of delivering new products, business benefits or organisational change (Winter et al., 2006). The widespread ‘projectification’ of work methods (Maylor et al., 2006) has led to these becoming the norm for many organisations. The PMI BoK (PMI, 2008:5) defines a project as “a temporary endeavour undertaken to create a unique product, service or result”, and the APM BoK (APM, 2006:xv) defines it as “a unique, transient endeavour undertaken to achieve a desired outcome” (see also Söderlund, 2004). However, many projects are seen as failures, often in the public spotlight (Cerpa and Verner, 2009; Cicmil and Hodgson, 2006; Nelson, 2007), highlighting the need to understand and improve performance in an increasingly complex and competitive world (Shenhar and Dvir, 2007).

The field of project management has its roots in operational theory (for example Brown et al., 2001; Söderlund, 2011) with an operational research tradition (Hodgson and Cicmil, 2006b), and much of the practitioner and scholarly literature focuses on efficient execution (Söderlund, 2011). However, the emergence of *major projects* and *programmes* signifies the recognition that as projects become larger, ‘standard’ techniques may be insufficient, and this offers an important area of both research and practical benefit for organisations. The terminology, however, is not clear-cut (Pellegrinelli, 2011). *Projects* are generally considered as more tactical in nature, whilst *programmes* (which may contain projects) have a broader scope and contribute a greater strategic role, often involving organisational change. The PMI BoK (2008:9) defines programmes as “a group of related projects managed in a co-ordinated way to obtain benefits and control not available from managing them

individually". The APM BoK (APM, 2006:xv) defines them as "a group of related projects, which may include related business-as-usual activities, that together achieve a beneficial change of a strategic nature for an organisation." Similar descriptions are also offered by other authors (for example Lycett et al., 2004; Maylor et al., 2006; Pellegrinelli, 1997; Thiry, 2002). However, the use of the terminology in practice is variable, and this may hinder a coherent approach to the subject. The word *project* is used in this work as the object of study and is discussed in detail later in terms of clarifying the level of analysis. The use of the *project* rather than the *programme* as the area for research infers a certain level of stability in terms of timescale, scope and budget (a programme would be expected to be more exploratory) and so it is appropriate to expect efficiency and control to play more of a part throughout. However, in the organisation used for the research in this thesis, their projects are generally part of larger programmes (structured as part of customer accounts) and so the link to programmes is addressed where pertinent.

There is a growing recognition of the effects of *complexity* on project work (Cooke-Davies et al., 2007). The use of the word 'complexity' is intended more as a metaphor than as work based in the field of complexity science, although analyses at the project level have been undertaken (Gerald et al., 2011b). Whitty and Maylor (2009) categorise elements as having structural or dynamic complexity, either interacting or independent, and Maylor et al. (2008) also identify factors that make projects complex to manage. Specifically, these are *mission, organisation, delivery, stakeholders* and *team* - the MoDEST framework. These ideas are powerful in understanding practical difficulties, and why both delivery and learning in complex projects are difficult. Williams et al. (2005) also address this, and highlight that learning in such an environment is troublesome, since cause-effect relationships may be unclear. It is apparent, therefore, that simple approaches to the subject are inadequate.

In terms of the wider subject of organisational learning, we know that project learning is difficult and often unsuccessful (Ayas and Zeniuk, 2001; Keegan and Turner, 2001; Newell et al., 2006; Sapsed et al., 2005; Turner et al., 2000; Williams, 2008) and the evidence for project-based 'learning organisations' is low (Love et al., 2005b). It is an area that offers special difficulties when we consider learning mechanisms. Firstly, all projects are, to a greater or lesser extent, unique, although the degree of novelty can vary considerably, from 'one-offs' (Grabher, 2004a) to similar, recurring, offerings where firms can improve and benefit from "economies of repetition" (Davies and Brady, 2000:932). Secondly, they are time-bound, with staff brought together for a specific purpose and duration, after which the group disbands (Grabher, 2004b; Williams, 2008). Bresnen et al. (2005b) argue the project context is particularly interesting in this respect, as the discontinuities inherent in project-based organisations mean that teams disperse at the end of the work, but this may be offset by the fact that individual social networks may expand due to this renewal process. Additionally, project organisations often employ contract staff, potentially exacerbating the knowledge-loss problem (Keegan and Turner, 2001). There is often no clear mechanism by which the learning can be captured, as would normally be the case in a functional organisation, and the learning may often be captured mainly by groups and individuals (Swan et al., 2010).

There is a need to understand learning mechanisms in this environment (Love et al., 2005a) such that we may better comprehend the phenomena of learning in this specialised context (Lycett et al., 2004; Thiry, 2002; Williams, 2008). Since projects often consist of multidisciplinary teams (Edmondson and Nembhard, 2009; Fong, 2005), this requires team interaction, with knowledge sharing, rather than hoarding

(Hall and Sapsed, 2005) if useful learning is to occur. However, this is far from straightforward (Coutu and Beschloss, 2009; Gilley et al., 2010). The emphasis on the social and community nature of the work is evident (Bresnen et al., 2005a; Bresnen et al. 2005b; Grabher, 2004a; Keegan and Turner, 2001; Lindkvist, 2005; Newell and Huang, 2005; Williams, 2008) as is the benefit of reflective actors (Cicmil, 2005; Gustafsson and Wikström, 2005; Scarbrough et al., 2004a). The socially-constructed and tacit nature of some important project knowledge is a factor in the effectiveness in the lessons-learned process (Koners and Goffin, 2007). Indeed, Liebowitz (2005) advises that much of the knowledge management process is more of an art than a science, with 80% down to people, processes and culture, and only 20% reliant on technology.

We also need to consider the broad environment of the management of projects. Regardless of the level of detail in the planning phase, projects (especially in the technical sector) usually encounter issues to be overcome (Andersen, 2006). It has been shown that solving these requires technical skill, experience and also an element of creativity. Brown and Eisenhardt (1995) use the term 'disciplined problem solving' to describe the balance between relatively autonomous problem-solving by the project team and the discipline of the management process. Feldman (1989) and Kessler and Chakrabarti (1996) argue for a balance of autonomy and control in innovation within an organisation. The 'continuous change' of Brown and Eisenhardt (1997) also offers insight, and their study of product innovation in the computer industry shows that a blend of both organisational structure and process flexibility is required. Tatikonda and Rosenthal (2000) show that a formal process is important at the project level, with flexibility needed at a working level. Other researchers have also shown the benefits of creativity and improvisation in the development process (Crossan et al., 2005; Cunha and Comes, 2003; Kamoche and Pina, 2001; McGrath, 2001; Nonaka, 1994) and whilst it is beyond the scope of this work to examine this literature in depth, it supports the concept of knowledge creation supporting knowledge refinement in more innovative project behaviours throughout. With this line of thinking, Quinn (1985:83) shows that successful innovation can be "chaos within guidelines" whereby the work may be opportunistic in tumultuous environments.

There is no 'one-best-way' for project-based organisations to learn, as the benefits and appropriate mechanisms are firm- and situation-dependent (Brady and Davies, 2004; Prencipe and Tell, 2001; Prencipe et al., 2005). The idea that prescriptive solutions are the answer to project learning is not generally supported. Turner et al. (2000:16) summarise this beautifully: "There are apocryphal stories of people applying PMI's Guide to the PMBoK to the letter on every project, and their project performance falls. This is not a fault with PMI's PMBoK, but with the way it is being applied. Every project is different, and so every project requires a unique procedure ... People who have the lack of maturity that makes them want to follow procedures to the letter should not be allowed to practice as project managers" (see also Morris et al., 2006). Organisations need sources of variation to go beyond what is already known, such that learning may in fact take place (Keegan and Turner, 2001).

How, then, can we usefully conceptualise learning in projects? Edmondson (2008) distinguishes between *execution-as-efficiency* and *execution-as-learning*, and, whilst her work was undertaken in a different field, this idea provides a potentially useful delineation between types of projects. Whilst some project work may be treated in terms of repetitive operations (and therefore potentially optimised via controlled processes), the projects of interest here are those in which ambiguity and complexity (broadly understood) are inherently present. This conceptual approach encourages the integration of the learning literature with that of project

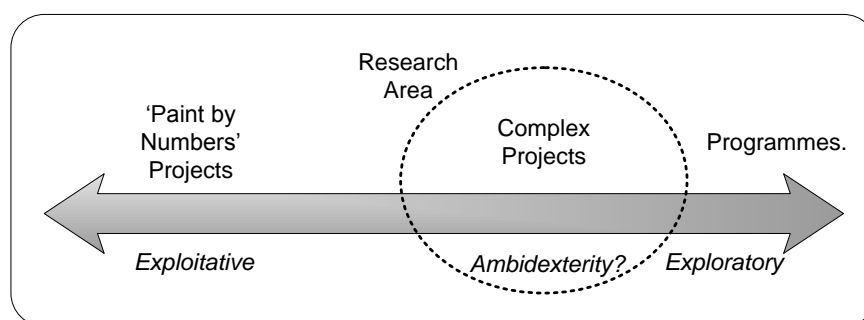
management, with the epistemological position that the learning is considered with regard to the practices that constitute the execution of the work. The focus will therefore be on *in-project learning* leading to improvements in project delivery, rather than how the wider firm-level learning occurs, although project-to-project learning within the bounds of a single programme may be relevant. In line with this, the unit of analysis will be taken at the level of the manager (to be discussed in greater detail, later), and the boundary of the learning will be taken at the project level, rather than that of the firm. Hence the investigation will involve both task achievement and learning (Arthur et al., 2001; DeFillippi, 2001), understood here as *knowledge refinement* and *knowledge creation* (i.e. ambidexterity). Considering the difficulties mentioned above, conceiving of this as an inherent part of project *action* is appropriate, together with the management practices that support it. This is expanded, later, and is consistent with the ideas of valuable, ongoing learning as part of business operations (e.g. Gilbert and Eyring, 2010).

We can consider the benefits of learning in two forms. Firstly, organisations can learn through re-use and refinement of existing organisational competencies (Prahalad and Hamel, 1990), such as technical skills and project management processes (exploitation), so as to build on existing expertise in order to improve performance. Secondly, it must also be acknowledged that there is a need to overcome specific issues associated with each individual project (exploration) (Lévárdy and Browning, 2009). This is an inherent requirement in the context of projects, which cannot be rehearsed, and are inherently dynamic and uncertain (Geraldi et al., 2011a).

### 2.8.1 Projects and ‘Project Capital’

In investigating projects and their management, the widespread use of the word ‘project’ requires that this be defined further. Maylor (2003:4) offers the continuum of Figure 26, ranging from relatively undemanding “paint-by-numbers” projects to large programmes. There is an increase in the variety of processes required in the work, and different management techniques are required, depending on the position along this line (Shenhar, 2001b). To the left, a more exploitative approach would be expected, whereas for uncertain programmes on the right, where the details unfold as the work progresses, we might anticipate a more exploratory approach. Note that this presents a definitional difficulty, as there is a grey area in distinguishing between large complex projects, and programmes (Pellegrinelli, 2011). However, the terminology of ‘projects’ will be used as the area of investigation and level of analysis. This work is intended to be situated in the broadly central area of ‘complex projects’, where ‘straightforward’ execution is insufficient. This is the area in which the role of ambidexterity is expected to be of most benefit, as highlighted. This idea is further developed and refined later to develop the main research plan. It is accepted that even small projects may require exploratory problem-solving, and large programmes will also include standard, exploitative, functions, so Figure 26 is intended to be indicative at a high level only.





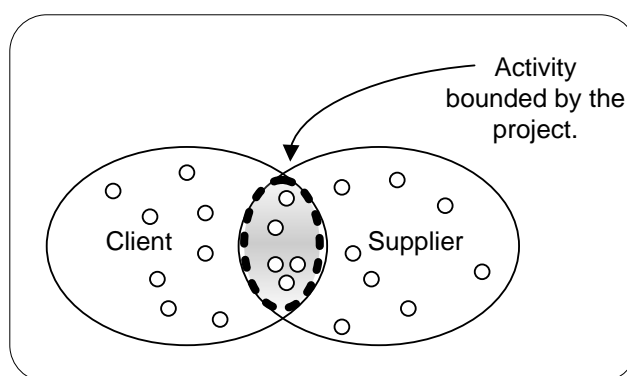
**Figure 26: Proposed Scope of Research**

This investigation therefore centres on projects consisting of complex products and systems ‘CoPS’ (Davies and Brady, 2000; Davies and Hobday, 2005). Prencipe and Tell (2001) characterise this work as “capital-, engineering- and IT-intensive, business-to-business products, networks, constructs and systems. They are often produced in multi-firm alliances, as a one-off or in small customised batches for specific customers and markets.” These are provided by knowledge-intensive firms (KIFs) where “exceptional expertise must make an important contribution.” (Starbuck, 1992:716). The use of the term ‘project’ in this work will refer to the Figure 26 concept of a complex project. Although the research presented later incorporates projects within wider programmes, the intention is not to focus solely on the large programmes themselves.

There is support in the literature for looking outside the firm-level analysis. Kogut and Zander (1996) identify that knowledge can reside in the network of interacting firms, and Gulati et al. (2000) extend RBV beyond the boundaries of the firm to incorporate “network resources” (2000:207). This idea is discussed at length by Swart and Kinnie (2008:2) who identify that under these circumstances “the locus of control does not exist with any *one* actor but it becomes a property of the relationships between actors in the networked processes.”

In the management of projects, the temporary nature of the task structure (Söderlund, 2004) and the importance of client / provider interdependencies and relationships (Lycett et al., 2004) mean that using the project as the level of analysis is far more relevant. In this case the area of analysis for research is defined by *the activity within the project* (Figure 27), where the learning occurs in a network context (Grabher, 2004a; Grabher, 2004b). Argote et al. (2003:578) also comment that knowledge is more likely to transfer across units that are part of the same organisation, so the definition of that boundary in terms of the project is of interest. Simsek (2009:605-6) argues that “While OA [organisational ambidexterity] has not been related to interfirm-level analysis to date, the notion that network ties are a key vehicle for both exploitation and exploration is the basis for an important stream of research.”

Swart and Kinnie (2008) refer to this level of organisational knowledge as *Network Process Capital* (NPC), consisting of the activities within the boundaries of the project. This is where clients and suppliers interact, potentially developing specific competencies crossing the boundaries of the firm (Henderson and Cockburn, 1994). This can incorporate both internal and external knowledge processes (Raisch et al., 2009), and NPC therefore can be considered as an aspect of OC as the relevant organisation-level construct.



**Figure 27: Network Process and Boundary of Analysis**

It is important to understand that in operationalising the level of analysis as the project, the simple model of Figure 27 needs expanding in two ways. Firstly, it is necessarily an oversimplification when considering project boundaries, as projects can be carried out by a large consortium of firms (such as a large construction project), or within the boundary of a single firm (a specific product development, for example), but the issue is raised so as to identify the level of analysis under a range of circumstances. The diagram indicates a dyadic relationship (this is indicative only, although each of the case studies used later is broadly of this form), yet we must understand that this is actually comprised of multiple actors each with a complex network of relationships. Whether treating the project as a dyad, triad or single organisational unit, this complexity must be acknowledged. Additionally, whilst the focus of the work is on the managerial aspects, the role of the other actors (such as the programme manager, delivery manager, technical manager, team leaders and so forth) is critical in the project delivery process and must be recognised. Note that at this stage the diagram of Figure 27 is relatively abstract, and the practical realities of the projects used for the research are discussed in detail, later.

Secondly, we must accept that the project does not exist in isolation from the participating organisation(s). As Engwall (2003) argues, projects are not 'islands', they are influenced by organisational and historical contexts. This is also supported by Simsek (2009:606), who comments that "A key idea to this line of research is that organizations are embedded in the structure of their network relations that constrain and enable their behaviour and economic action." Similarly, Raisch and Birkinshaw (2008:401) advocate a granular view of boundaries, recommending that: "Research into the boundaries that an ambidextrous firm faces frequently takes a system-level view of phenomena that actually vary at the subsystem level... Future research should thus complement the system-level analysis of boundary conditions with a more fine-grained investigation of lower level task environments and their interrelations with ambidextrous structures, contexts, and leadership characteristics."

Given that the shaded area of Figure 27 does not represent an 'organisation', the use of 'organisational capital' as a subcomponent of intellectual capital is inappropriate. In using IC resources as an input in the I-P-O model, a modification of the OC construct is required in order to align it with the level of analysis under investigation. Hence I use a new construct, 'Project Capital' (PC), representing organisational processes bounded by the activities undertaken within the project. This is defined shortly in section 2.8.2.4 following a literature review, but is highlighted here to explain the rationale.

Therefore in promoting project capital as a concept, we must be mindful that this construct will be influenced by, and may well itself influence, the wider organisational capital of the participating organisation(s). Indeed, in Figure 27, we should consider the shaded boundary of the project more as a permeable membrane between the project and the constituting firm(s). Whilst it is not the intention of this work to investigate this aspect in depth, it must be considered as part of the understanding of the level of analysis.

## 2.8.2 Linkage of IC to Project Management

As highlighted previously, there is a significant volume of literature on intellectual capital, and so determining the applicability to this research is challenging. To address this, a further, and significantly shorter, literature review was performed to address the scholarly intellectual capital work as it pertains to the management of projects.

**Search Question: “What important characteristics of intellectual capital have been identified with regard to project management and project managers?”**

The reviews were performed in the ProQuest and EBSCO databases in early 2010 using peer-reviewed journals (since this contains the key journals used previously).

In the table below, there was some overlap with five papers identified in multiple categories. The keyword search brought in much literature that was deemed not relevant to this study, and many papers (39%) were rejected.

The sources (in terms of journals used) are also given below.

**Table 8: IC and PM Literature Search Results**

<i>Search Terms</i>	<i>Number of Responses</i>	<i>Include / Reject</i>
Intellectual Capital AND Project Manage*	18	12 / 6
Human Capital AND Project Manage*	53	27 / 26
Social Capital AND Project Manage*	17	15 / 2
Organi* Capital AND Project Manage*	2	1 / 1
Structural Capital AND Project Manage*	0	0
<i>Total</i>	<i>90</i>	<i>55 / 35</i>

**Table 9: Source of IC / PM Literature**

<i>Qty</i>	<i>Journal</i>	<i>Qty</i>	<i>Journal</i>
8	Int. Journal of Project Mgt. (2*)	1	IBM Systems Journal (--)
6	Management Science (4*)	1	Information Sys. Research (4*)
5	Project Management Journal (2*)	1	Int. Jnl. of Bus. Perf. Mgt. (1*)
4	Communications of the ACM (3*)	1	Int. Jnl. of Production Res. (3*)
2	Personnel Review (2*)	1	Jnl. of Constr. Eng & Mgt. (--)
2	Strategic Finance (--)	1	Journal of Mgt. Education (2)
2	The Learning Organization (1*)	1	Jnl. of Manag'l Psychology (1*)
1	Academy of Mgt. Journal (4*)	1	Management Decision (1*)
1	British Jnl. of Ind. Relations (4*)	1	McKinsey Quarterly (--)
1	British Journal of Management (4*)	1	Organization Science (4*)
1	California Management Rev. (3*)	1	Public Manager (--)

1	Eng. Const. & Architec. Mgt. (1*)	1	R&D Management (--)
1	Facilities (--)	1	S. African Jnl. of Ind. Eng (--)
1	Human Systems Management (--)	1	Strategic Outsourcing: an Int. Journal (--)
			<i>TOTAL: 50 [overlap=5]</i>

The findings from each of the searches are summarised below.

### 2.8.2.1 IC, OC + PM

Chinowski et al. (2008) argue that engineering and construction projects have for too long relied on an 'engineering' approach to project management, with an optimum plan and detailed resource allocation. They advocate a social network analysis (SNA) approach to move from the idea of efficiency to high performance, emphasising the role of individuals in achieving team outcomes. Using SNA, communication mechanisms and structures can be better understood. Similarly, Luo (2005) looks at how knowledge possessed by groups is more than the aggregation of individual knowledge. Studying social structure, he advises that a project team with a median centralisation of power performs well, as does a team structure with fully connected cliques. It is also found that only *consultative* ties are related to knowledge exchange and combination, while *friendship* ties have no impact on team performance.

A comparable approach is taken by Brookes et al. (2006). They identify how improving the 'connectivity' and 'conductivity' of relationships can improve project social capital. In a study of over 700 relationships in UK engineering projects they find that levels of trust and respect in relationships, the age of the relationship and the degree to which the people involved in a relationship share a common professional background or interact outside the project, all correlate significantly with the conductivity of a relationship. They advise that "project social capital is the sum of resources that can be used to achieve a project's goals that are available through the network of relationships associated with that project" (2006:477). McKinley (2000) highlights the difficulties if team members leave at key times, and advocates a retention programme as the project 'goes live' to prevent this.

DeFilippi and Arthur (1998) take an alternative view, studying the paradoxes within the film industry and show that the impermanence of film-making is supported by the human capital of individuals within a structure of social capital so that a network of participants learns about each others' strengths and weaknesses over time. London et al. (2005) study the architectural design process in international projects, which necessitates significant, often cross-cultural, communication and changes throughout the project. An adaptive approach should be accommodated, and this may be stifled by a formulaic, linear development.

Van Donk and Riezebos (2005) advise that there are three types of knowledge in a project organisation: entrepreneurial (in the sense of work acquisition), technical, and project management knowledge. They recommend that experience is the best proxy for project management knowledge, and show that a knowledge inventory can be developed by aggregating measured individual experience to generate a picture of the organisation. De Vries and Conradie (2006) also advocate blending knowledge management into process and project capability maturity evaluations, and Maqsood et al. (2007), discuss 'knowledge pull' and advocate that construction firms utilise the knowledge generated in universities and other research organisations.

DeSouza and Evaristo (2004) distinguish between knowledge *in* projects, knowledge *about* projects and knowledge *from* projects. They discuss centralised and peer-to-peer approaches (based on the IT structure), and propose a hybrid model of both. In this way, knowledge *about* and *from* projects is stored centrally, whereas knowledge *in* projects is best accessed locally. Cameron (2002) also advises against a one-size-fits-all project management approach, but shows how IBM approaches this with modular development, categorised by 'work product descriptions'. Singer (2003) also describes how context-specific intellectual capital in the form of project plans can be shared and re-used around IBM.

In the search of terminology '*organisational and structural capital with project manage\**', far less research was forthcoming. Liberatore and Titus (1983) find heavily finance-based methods for project selection, together with perceived dissatisfaction in methods for scheduling and control, although given the age of the research, this data is likely to have been superseded.

### 2.8.2.2 SC + PM

Julian (2008) studies the role of the project management office (PMO) in learning and knowledge transfer. He highlights how PMO managers can act as knowledge brokers between projects and communities of practice, and that social capital is intrinsic in this function. However, evidence shows that 'green' (on target) projects are mostly left alone and that the majority of activity is centred on attempting to bring 'red' (underperforming) projects back on track. This can lead to the situation where learning the lessons from projects is insufficiently balanced, if attention is focused on identifying and avoiding failures rather than equally on promoting successful practices. Walker and Christensen (2005) look at highly-evolved project offices as 'centres of excellence' such that they both push and pull knowledge by better utilising multiple knowledge communities. The authors highlight the role of social capital in enabling project management teams to make 'wise' decisions.

Huang and Newell (2003) study four cross-functional projects, and find that emotional buy-in is beneficial if stakeholders are to be engaged, as well as structural ties and shared narratives formed by regular communication to promote project awareness. Knowledge integration in cross-functional project implementation is aided by this social capital, and it is important if the project is to be successful. Aquino and Serva (2005) also highlight the importance of regular communication in building social capital, and that social capital encourages development teams to perform more than is initially required of them.

Newell et al. (2004) use a case study to distinguish between 'bridging' and 'bonding' social capital in an IT project. Bridging refers to external knowledge acquisition, whereas bonding refers to team knowledge integration, and these utilise weak and strong ties respectively. In the case study the project manager allocated tasks to individuals in a manner that discouraged bond-building, and although this may be in line with a more 'rational' management approach, in practice the results may be expected to be insufficient if social capital is poorly developed as a consequence (see also Adler and Kwon, 2002). The authors propose that external knowledge is best integrated once internally strong social capital bonds have been developed within a team. This provides a strong counter-argument to the prescriptive 'toolkit' argument prevalent in the IT industry (Ben-Menachem and Gelbard, 2002).

Tansley and Newell (2007) also argue that the need to integrate knowledge in projects means that social capital is essential in project success. They examine the

role of project leadership, investigating how the leader engenders team trust to develop and use social capital. Using two case studies (one where trust developed, and one where it did not), they highlight three forms of project leadership that are beneficial. Firstly, *external leadership* involves engaging stakeholder support so that the project is sustained. Secondly, *internal leadership* is necessary to ensure the trust and motivation of the team, and, finally, *hybrid leadership* involves an understanding of the details of the project (in these case studies, IT systems) so that the leader can understand the implications of the project and thereby gain trust from participants. This paper does support the arguments made earlier that project managers should develop their networks of strong and weak ties, and also act as both a specialist and a generalist. Although Tansley and Newell (2007) only use two cases, the conclusions indicate that an ambidextrous approach is beneficial in enabling project success.

In other work, Lacity and Rottman (2009) show that social capital between executives on both sides of an outsourcing arrangement increases the supplier commitment, even if those individuals are not directly involved in the day-to-day management of the work, and Manu and Walker (2006) discuss the important role of social capital in knowledge transfer within aid projects. The immediacy of the social network is also highly important factor, and Burt (2007) shows that 'secondhand brokerage' is of significantly lower value. However, Grewal et al. (2006) identify that understanding network effects in open-source software development is substantially more complex. Ibarra et al. (2005) highlight the research gaps in social capital field, and recommend looking at the effect of individuals within the wider network structure.

### 2.8.2.3 HC+PM

The role of human capital was by far the largest contributor to this literature review. Ansoff and Brandenburg (1971a; 1971b) identify the project as an adaptive organisational form to achieve both strategic and operational responsiveness, and this is achieved through people. Thomas and Mullaly (2007) attempt to assess the value that project management brings to an organisation, and identify the significant difficulty in assessing this. Five types of value were chosen, and the authors based these on the HR literature: 1. Satisfaction, 2. Aligned use of practices, 3. Process outcomes, 4. Business outcomes and 5. Return on investment.

In order to bring about this value, the responsibility for work assignments and staff allocation falls to the project manager (Goodman, 1971). Brown et al. (2007) identify that project managers embody three forms of human capital: *human* skill ('people skills'), *organisational* skill and *technical* skill. They argue that the most important of these is the ability to mobilise and motivate human resources, and so the PM "needs to be more 'socially oriented' than 'functional'" (Brown et al., 2007:78). Using data from projects in the UK and Saudi Arabia, the authors compare project management human capital against time performance and find that there is a positive relationship between the two, indicating the important role of the project manager in outcome success. However, using only time performance is a limitation of the study. Similarly, Banik and Bhaumik (2006) show that a *lack* of skilled project management staff contributed to poor performance in aid projects in the Caribbean.

The role of project manager is often taken after a previous specialism (such as engineering), and the position covers many different aspects, leading to a diverse set of training requirements (Smith, 2003). In the field of federal programme management in the U.S., Rezvani and Pick (2008) also highlight the need for succession planning, formal training, and coaching to prepare the next generation of

managers for increasingly complex responsibilities. Shelton (2003) argues that the role of an integration manager can be integral to the success of an organisational merger, and that this role needs situational expertise and experience beyond that often considered within the terminology of project management. Finding the right person is instrumental in accomplishing the desired outcome.

McCray et al. (2002) discuss the role of heuristics used by project managers in decision-making. Drawing on past experience is extremely powerful, yet may lead to biases with detrimental effects on the project outcome. Initial errors in the project estimates can lead to significant difficulty later on, and these may be due to inappropriate comparisons with previous experience, misinterpretation of data, reliance on profound effects, misapplied risk, 'anchoring', a preference for intuition, bounded rationality, narrow beliefs, a failure to consider the alternatives, and reliance on personal preference. During the execution phase, similar issues can arise, consistent with a non-rational interpretation of events. Reflecting and learning from these experiences, though, can be hampered by 'hindsight bias' at the end of the project. These issues can be mitigated to some extent by an emphasis on objectivity and clearly communicated processes using a group approach to reduce the potential impact of a single individual's biases.

Ebadi and Utterback (1984) emphasise the importance of project communication. Their findings indicate that at the individual level, the frequency, project centrality, and diversity of communication all have positive effects on the success of technological innovation. However, the frequency of communication was found to have a greater effect than either centrality or diversity, and, interestingly, they also found that high formality of communication had a negative effect on technological innovation. Network cohesiveness had a strong and positive effect on project success, and the authors recommend boundary-spanners and gatekeepers to aid knowledge flow. Brook (2005) entertainingly highlights the worst project management practices within the television production industry, highlighting both the value of adopting good practices, but also the creativity and flexibility that are required to manage within such a turbulent environment.

Looking at the wider HR context, Moore (2008) shows that firms can flexibly increase their staffing by hiring expert project staff on an as-required basis for specific objectives. The heterogeneity of project actors can require detailed planning to make sure that specialists can contribute their knowledge to the right project at the right time. Hendricks et al (1999) argue that this requires short-, medium- and long-term planning, together with linkages and feedback. The balance of specialists and generalists in a project can be reflected in the 'scatter factor', a higher value of which identifies that tasks are performed by a number of part-time contributors. However, it is important to consider the human factors in such an exercise (Roy et al., 1998). Although it is possible to use algorithm-based staff selection and allocation processes (Weglarz, 1981; Yoshimura et al., 2006), these ideas neglect the value of social relationships, team experience and the less tangible benefits of existing networks that can positively influence the allocation process. Klein et al. (2002) also advocate that IT project teams contain professionals with a blend of skills, namely technical skill, the ability to empathise with end-user needs, and political skill and organisational awareness. This combination is advocated to reduce the high failure rate associated with such projects.

Huemann et al. (2007) argue that human resource management (HRM) in projects is an underdeveloped area of research and theory, and that the role of the project manager with regard to HRM is rarely discussed (also supported by Belout, 1998; Belout and Gauvreau, 2004). They discuss how project management careers may

be built based on increasing experience and competence. Clark (1999) details how one engineering company instituted HRM changes to its project-based structure to realise financial benefit from more HR involvement. Clark and Colling (2005) also highlight the lack of overlap between project management and human resources literature and, in case studies of two engineering organisations, they find that the technical background of the staff is reflected in the nature of the ongoing training, whereas general and project management skills were lacking. They also highlight the difficulty of embedding HR changes into these environments where practices can be project- and project-manager specific.

In an alternative approach, Koh et al. (2004) look at the psychological contract aspects of IT outsourcing, and find that outsourcing success is associated with the meeting of the perceived obligations, which may not necessarily align with the contract between the organisations.

Human capital in the team context is also addressed. Jordan et al. (2005) identify 36 attributes significant to project members in research teams (categorised in four groups: development of human resources, creativity and cross-fertilisation, internal support systems, and setting and achieving relevant goals). They find that along three dimensions of analysis (science versus technology orientation, small versus large project, and specialised versus complex work teams), the participants reflected different views as to which factors were most important. This is significant in that project managers therefore need to ensure that the management style is consistent with the situational aspects of each project.

#### 2.8.2.4 Summary of Findings

The intersection of the intellectual capital and project management peer-reviewed literature has been reviewed with respect to its relevance to this research. Whilst the literature did not highlight any 'surprising' findings, of particular interest is the differentiation between project management knowledge and the domain-specific technical knowledge that the project manager may also bring. With regard to the specialist / generalist discussion earlier, the 'specialist' role can therefore be considered in these two distinct forms. The key literature themes are indicated in Table 10, below.

**Table 10: Key Literature on IC and Project Managers / Management**

IC	Factor	Authors
HC	Individual Experience	Chinowski et al. (2008), McKinley (2000), McCray et al. (2002)
	Proj Mgr Leadership	Brown et al. (2007), Tansley and Newell (2007)
	Proj Mgr Knowledge	Banik and Bhaumik (2006), Brown et al. (2007), Tansley and Newell (2007), Rezvani and Pick (2008), Shelton (2003), Smith (2003)
SC	Project performance benefits derived from well-functioning social network	Brookes et al. (2006), Chinowski et al. (2008), DeFilippi and Arthur (1998), Julian (2008), Luo (2005), Newell et al. (2004).
	Effective Communication	Ebadi and Utterback (1984), Huang and Newell (2003), Julian (2008), London et al. (2005)
	Access to External Knowledge	Maqsood et al. (2007), Newell et al. (2004)
OC	Organisational Responsiveness	Brook (2005), London et al. (2005)



	Knowledge Repository	Cameron (2002), DeSouza and Evaristo (2004), Singer (2003)
	PMO	Julian (2008) , Walker and Christensen (2005)

Given these findings, it is appropriate to define the forms of capital for this research such that they are identified. The terms in the wider literature are relatively broad, so will be defined for use within the context of the management of projects.

**Human Capital (HC): “*The knowledge, skills, experience and leadership capability embedded within the individual.*”**

Key dimensions of HC: experience, leadership, domain knowledge, project management knowledge.

**Social Capital (SC): “*The network of formal and informal relationships to enable knowledge generation and transfer.*”**

Key dimensions of SC: network, communication, trust, shared language.

As discussed in section 2.8.1, the ‘OC’ element for use in the project domain is ‘project capital’ (PC) and henceforth this will be subcomponent of intellectual capital used in the context of projects.

**Project Capital (PC): “*Existing organisational knowledge, together with the formal and informal processes and routines that operate within the boundary of the project.*”**

Key dimensions of PC: processes, procedures, flexibility, knowledge repository.

### 2.8.3 The Role of Project Complexity

It is beyond the scope of this work to investigate in detail the impact of complexity, since complexity science represents another significant body of evolving literature. The use of the word *complexity* is intended as a metaphor for difficulty, ambiguity, complicatedness and uncertainty. The effect of project complexity in terms of organisational ambidexterity and performance represents an alternative and broader investigation that this work addresses as part of the context of projects. The heterogeneity of the project world requires that a suitable mechanism be used to compare and contrast examples and cases.

The literature on complexity is growing rapidly, and the application of the subject to the management of projects is the subject of a review by Geraldi et al. (2011b). They synthesise the previous literature on the subject and categorise project complexity into five types:

- 1) *Structural* complexity (size, variety, scope, interdependence)
- 2) *Uncertainty* (commercial and technical novelty, staff experience, availability of information)
- 3) *Dynamic* complexity (change over time)
- 4) *Pace* of the project, and
- 5) *Socio-political complexity* (stakeholder support, hidden agendas, resistance).

It is not intended that the full literature on complexity be reviewed, since that is beyond the scope of this work. However, the thorough review of Geraldi et al. (2011b) regarding the applicability of the subject to project management provides a framework with which to operate, as it is a synthesis of the previous project complexity literature. These concepts will be used as part of the case selection criteria, and although they do not readily lend themselves to clear, objective measurements, they can be used to provide guidance on higher- and lower-complexity projects. This is shown later in the research design and used in the case sampling. The details of how this is achieved are given in that section.

#### **2.8.4 Role of the Project Manager – Theory in Context**

Referring back to the ambidexterity literature and the findings highlighted in Figure 16, it is clear that the role of management is considered important in enabling ambidexterity. Individuals performing the management function should have the best oversight of, and influence over, the multi-level, multi-domain nature of the project organisation. Knowledge of both the subject-matter (for example, IT skills) together with wider project and business knowledge and experience infers that such an individual can exhibit ambidexterity, and this is studied.

Whilst the argument up to this point has been mainly theoretical, it is important to be able to understand the logic in a practical environment, such that the purpose of the theory is evident and relevant to practice.

How, then, does the theory translate into practical, day-to-day, reality in the management of projects? Let us consider a project manager running a product development team. If he or she has technical and project management knowledge (specialist human capital), this is likely to be beneficial since judgements and decisions can be based on a depth of knowledge appropriate to the tasks. However, wider knowledge of firm strategy, marketing, finance, manufacturing operations, key customers and suppliers, and so forth (generalist) are also useful since then the project can be understood in relation to the wider organisational issues. This may lead to different and 'better' (certainly better-informed) decisions than those taken from a purely technical standpoint, since they are supported by a greater amount of relevant knowledge.

From the SC perspective, if the manager has strong ties to his / her team, this generally aids day-to-day management, since the group can have an implicit understanding and history that facilitates more efficient group dynamics and task allocation (cooperative SC). Greater trust and understanding reduces the need for checking, and miscommunications are reduced. However, if the manager also has a wide range of contacts and social relationships with individuals in other departments, together with suppliers and customers (entrepreneurial SC), this can enhance the ability to 'get things done', often informally, so that the project delivery is enhanced. Finally, whilst formal process-based activities (mechanistic) are well-used in the management of projects (and form the basis of much of the training), all project management needs an acceptance of the fact that there are not prescriptive solutions for all issues, and that real management demands a certain amount of flexibility to meet the project goals. Project management requires a level of pragmatism in the face of inevitable difficulties.

To understand the benefits of these concepts, consider what would happen if they were absent: a project manager with very little domain or business knowledge, a project organisation brought together with no working history to achieve a demanding objective, with no organisational processes to follow and limited

capability to innovate. It is evident that success under these circumstances would be unlikely.

In terms of ambidexterity, the role of exploitation and exploration can also be readily understood. Project organisations can be classified in terms of their maturity, and moving from a lower to a higher state can be thought of as exploitation, as processes are improved. A high level of maturity demands continuous improvement, so also demonstrating further refinement. In practical terms this can mean using lessons-learned, but can also be the effective use of standard project management techniques. A straightforward weekly meeting where progress is shared and appraised, risks evaluated and next week's priorities assessed means using recent learning to improve action, and should be an ongoing method of exploitation. Effective management of projects therefore infers effective exploitative learning, since progressive knowledge refinement is, in practice, beneficial in keeping the work on plan.

A similar approach can be taken for exploration. As an example, a new product development will most likely require an element of innovation and testing since the final answer may not be known at the beginning of the project. In IT-service delivery, the user requirements might not be known at the outset, nor the methods (both technical and managerial) by which they are going to be met. Any organisational change project or service implementation needs some flexibility to meet the requirements of the stakeholders, since these are likely to evolve during the process. So although the work may be planned in advance, even to a detailed set of customer requirements, uncertainty is often inherent and the project delivery itself is a creative act that cannot be fully forecasted in advance. The role of the project manager is therefore to ensure that these processes are kept in line and that the ongoing learning is harnessed to support the project objectives. This is also reflected in the evaluation of the project, since meeting the original time, cost and quality objectives does not necessarily ensure customer satisfaction if the requirements undergo change (whether documented or not) as part of the work.

This, then, is the practical rationale behind the theory developed. Whilst the arguments have been generated through analysis of literature, when applied to a practical situation, the relevance is apparent. Note that, as will be demonstrated later, the concepts of 'exploitation' and 'exploration' can be difficult to isolate when applied to practical operations, and although they are theoretically well-conceived, distinguishing them in real-world application can be challenging.

Referring back to Table 7, the research therefore poses the question of whether the project manager exhibits the six intellectual capital elements (both a specialist and a generalist, acting cooperatively and entrepreneurially, using mechanistic systems together with organic flexibility) in the performance of his/her job, and this represents a further research gap.

This is discussed further, later, with regards to the choice of respondent as part of the research process and focusing the research on the manager as the unit of analysis.

## 2.9 Outcome Measures

An important consideration is how to accommodate the outcome of this learning. The linkage of ambidextrous operation to performance outcomes is a significant concern, as appropriate metrics need to be used to assess success (Sarkees and Hulland, 2009). Although scholars have determined the relationship between ambidexterity and organisational success in empirical studies, this has been shown to be problematic due to the choice of measure used and the timeframe over which the study is performed. It is therefore important to refer to the pertinent literature for the context under investigation.

‘Success’ in complex projects is difficult to readily quantify as multiple stakeholders may hold significantly different views (Agarwal and Rathod, 2006; Atkinson, 1999; Bryde and Robinson, 2005; Karlsen et al., 2005; Procaccino et al., 2005). It is noted that the evaluation of project benefit may only be feasible after the work is complete and the team has disbanded, and this is difficult for both scholars and practitioners (Geraldi et al., 2011a).

Scott-Young and Samson (2008) show that different bundles of project team factors drive the three ‘iron triangle’ outcomes of time, cost and quality, indicating that even this success criteria should be kept disaggregated so that the most important outcomes can be prioritised. The implications for ‘softer’ success criteria need further research (Scott-Young and Samson, 2008). Shenhar et al. (2001) view these issues as strategic management questions, with wider implications than just the projects themselves. To investigate this further, a relatively simple literature review was performed:

**Search Question: “What is known about project management and project manager success?”**

The reviews were performed in the EBSCO database using peer-reviewed journals (since this contains the key journals used previously, and allowed a more focused search). The search term was “Project Manage\* Success” (to accommodate ‘manager’ and ‘management’). It is acknowledged that this terminology has limitations, but it is beyond the scope of this work to review all literature in this field. After trialling several versions of the search terminology, this one appeared to provide the most relevant papers without providing excessive material, and distinguishes the management aspect from the outcome. This is important since the research is not intended to be limited to post-completion evaluation.

**Table 11: Project Success Search Results, data as of May 2011**

<b>Search Term</b>	<b>Number of Responses</b>	<b>Include / Reject</b>
“Project Manage* Success”	23	19 / 4

From these results, four comprised book reviews and were insufficiently detailed to be included. The remainder are summarised below, and were taken from the following journals:

**Table 12: Sources of Literature**

Qty	Journal	Qty	Journal
5	Project Management Journal (2*)	1	Int. Rev. of Retail Distribution and Consumer Research (1*)
4	Int. Journal of Project. Mgt. (2*)	1	Jnl. of Constr. Eng & Mgt. (--)
2	S. African Journal of Bus. Mgt. (--)	1	Journal of Constr. Res. (--)
1	Info. and Software Tech. (2*)	1	Journal of General Mgt. (2*)
1	Information Systems Mgt. (2*)	1	Tech. Analysis and Strategic Management (2*)
1	Int. Jnl. of Networking and Virtual Orgs (--)		

Defining project management success has been shown to be particularly difficult. For example, the Sydney Opera House took fifteen years to build and was fourteen times over budget (Jugdev and Muller, 2005), yet it is proudly displayed as an engineering masterpiece. Jugdev and Muller (2005) advise that gaining consensus on what constitutes a successful project is akin to getting a group of people to agree on the definition of 'good art'. They argue that if only time, cost and scope are evaluated, then project management is limited to tactical value not strategic value, and advocate qualitative benefits evaluation as well as quantitative measures. The importance of satisfying stakeholders is also emphasised (Assudani and Kloppenborg, 2010).

Jugdev and Muller (2005) show that ideas of project management success in the 1960s-1980s were predominantly focused on meeting the 'iron triangle' of time, cost, and quality, then in the 1980s-1990s this evolved to the incorporation of lists of critical success factors (CSFs). In the 1990s-2000s, this transitioned into CSF frameworks, and they advise that the 21<sup>st</sup> century literature offers strategic project management, where the project owner bears more responsibility, including empowering the project manager with flexibility to deal with unforeseen issues.

Cooke-Davies (2002) distinguishes between *project management success* (meeting the traditional iron triangle requirements) and the broader *project success* (measured against the overall objectives of the project) that leads to benefits. Baccarini (1999) also advocates that project success consists of two components, product success and project management success. He advocates that project objectives can be broken into four elements: goal, purpose, output and input, and proposes that product success is evaluated against goal and purpose, and project management success against outputs and inputs. Al-Tmeemy et al. (2011) extend this such that project success is considered in terms of project management success, product success and also market success.

Ika (2009) argues that there is no such thing as absolute success in a project, only perceived success, and also no consensus in the literature. He finds 30 articles on the subject in the Project Management Journal and International Journal of Project Management from 1986 to 2004, and identifies that 25 of these bring criteria other than time, cost, and quality into consideration when evaluating success. He argues that 'project management success' does not necessarily lead to 'project success', and advocates an additional subjectivist, qualitative approach to the issue.

In a survey of Australian project managers, Collins and Baccarini (2004) find that the respondents' views of project success was (1) project management success (time, cost, quality) at 45%, (2) product success at 11%, and (3) both together, at

42% (with 2% giving no response). Of the project success criteria, the top three were time, cost and quality, followed by client satisfaction. Multiple other factors were identified, but scored significantly lower. The respondents believed that there was a positive relationship between project management success and product success, a view that appears to differ from Ika (2009). Interestingly, the majority of participants (66%) responded that project management success could be measured at any point in the project, but that product success should be measured after the product has been in use (70%).

Practitioner organisations may not provide the solution to these issues, as Yasin et al. (2000) show that significant gaps exist between project management practices leading to success, and the PMI Body of Knowledge. Thal and Bedingfield (2010) identify that managerial personality traits of 'conscientiousness' and 'openness' positively correlate with success. Rose et al. (2007) argue that project conditions necessitate certain project management competencies, and that these lead to desirable project outcomes. Through qualitative research they identify seven practical competencies (uncertainty management, personal management, business management, customer management, team management, process management and technical management) that they contrast with the normative 'tools and techniques' perspective. This is supported by Pant and Baroudi (2008), who argue that human skills such as relationship management are underemphasised. The PMI PMBoK emphasises 'hard' skills, at the expense of 'soft' skills, and they emphasise balancing these two in university education so as to lead to successful project outcomes. Rudolph et al. (2008) also support this in the retail setting, emphasising the importance of the behavioural aspect in generating success, and Mumbi and McGill (2008) show that trust in virtual teams predicts project success.

Kanter and Walsh (2004) look at improving organisational project performance, and link this to its skills and experience, track record, management climate and the specific project. They advise exploiting company strengths, whilst seeking to minimise weaknesses. Similarly, Huin (2004) advises that small firms operate differently from larger organisations, and that project management in the implementation of ERP systems should accommodate these needs in order to be successful.

Christenson and Walker (2004) emphasise the role of 'vision' in success, and show the four characteristics required: it must be understood; it must be motivational; it must be credible; and it must be both demanding and challenging. This requires transformational leadership, and adds to the requirement of the project manager.

Morrison and Brown (2004) argue that project success has life-cycle components. It must have 'selection success' (justification for the project), 'project management success' (meeting targets) and 'deliverable success' (longer-term customer satisfaction). They also propose four dimensions of project management effectiveness: organisational inputs (supportive organisation, rational project decision-making), project management process (tools, procedures, leadership, communication, resources and customer integration), short-term results (meeting project operational objectives consistently) and strategic impact (meeting strategic goals, project management is integrated into the organisation). Morrison et al. (2008) then take this further, testing the effectiveness measures against twelve dimensions of organisational culture. They find that there is a significant relationship between the two. Although the direction of causality is not clear, the linking of outcome to culture is interesting and moves significantly beyond early ideas of processes, tools and techniques being the major areas to address within an organisation.

Puddicombe (2006) shows two forms of learning that impact project outcomes. Firstly, participants need to learn about the planning of the project, and, secondly, they need to learn about each other. His work shows that continuous evaluation and the management of change is more effective than a predetermined plan in the execution of complex construction projects (contrary to much accepted practitioner wisdom). Indeed, planning during the construction phase itself is associated with superior performance. This supports the idea that ongoing learning and adaptation is important in the generation of a successful project outcome.

The NPD literature also contributes to this discussion, with Griffin and Page (1996) arguing that the relevant success measures for new product development depend upon the strategic rationale for the project.

In summary, this is clearly a difficult area, and it is inappropriate to try and create a simple 'output' measurement. Time cost and quality are important, as well as the perception of the customer, but so is the manner in which the project is performed. The relationship between project success and project management success is unclear, further complicating evaluation. It may be possible to conceive of the project performance in terms of both exploitative and exploratory elements. Time, cost and quality may be considered as potentially more mechanistic, exploitative functions, whereas the less tangible aspects of customer satisfaction may be considered as more exploratory.

This presents significant difficulty when compared to other I-P-O studies. In the key studies presented back in Table 5, the outputs were generally relatively simple and straightforward measurements, mostly financial. Given the difficulty in evaluating project performance, it would be inappropriate to choose a simple financial measure.

At this stage the output will be understood as 'the delivery of project objectives'. There are financial performance measurements that can be evaluated as part of this, and these form a key part of the sampling criteria used in the case study research presented later. The difficulty with this issue is discussed further in the next section.

## **2.10 Research Gaps**

As has been highlighted in this review, underexplored areas and research gaps have been identified that are suitable for study. Ambidexterity in organisations exhibiting multi-domain, multi-level structures has been highlighted as under-investigated, and the context of the management of projects represents a valuable area of research in which to study this.

In bringing together the literature and theory in this chapter, it is evident that a full comprehension of the 'how' of ambidexterity has not yet been developed. Theoretical gaps exist in the understanding of how complicated organisational structures may exhibit ambidexterity. The underlying micro-processes are as yet relatively poorly understood, and although the benefits to an organisation of being ambidextrous have been demonstrated, the practical mechanisms and managerial practices enabling this achievement are lacking. The majority of empirical studies to date have been at the organisation / structural level, with far fewer examining the detailed managerial role and the social context in which it is performed (Figure 16). Additionally, the field has been characterised by quantitative rather than qualitative research (Figure 9), and so these gaps may be usefully investigated by qualitative

analysis at the level of the manager to investigate the practices underpinning ambidexterity.

Key research gaps are therefore:

- [1] An understanding of the nature of ambidexterity at the level of the project.
- [2] How is ambidexterity achieved at the level of the project?
  - [2.1] How do the resources (as inputs) enable ambidexterity?
  - [2.2] What managerial practices enable the achievement of ambidexterity?

From section 2.7.8, this study proposes a qualitative approach to identify the managerial practices enabling ambidexterity.

The focus of the work will be on the role of the manager, since this was highlighted in the literature as under-researched in comparison to the organisation-level. It was shown back in Figure 16 that the 'individual-group' literature is sparse and that this area is poorly understood. This allows for specific examination of the work that the manager undertakes and his / her practices.

**The unit of analysis is hereby defined as *the manager*.**

From the literature review, it is apparent that there is a research gap in terms of considering how inputs (in this case, knowledge assets as resources) enable ambidexterity (here, at the level of the project), and how this leads to outcomes. This *input-process-output* perspective is powerful in examining mechanisms and enabling greater understanding of the phenomenon of ambidexterity. As highlighted back in Table 5, studies to date have not taken this approach directly, yet utilising such a basis of research allows a greater understanding of the issues raised within the review.

Again, it is emphasised that the I-P-O studies back in Table 5 have been undertaken at the level of the firm, organisation or business unit, rather than looking at the level of the individual. Significantly, the range of 'inputs' is extensive, yet the use of knowledge assets as the input resources has not been addressed. Not all of them can be readily addressed by looking at the managerial role in projects, but five key papers can be built upon, and these are shown in Table 13.

**Table 13: Key Input-Process-Output Papers to Build On**

<i><b>Paper</b></i>	<i><b>Input</b></i>	<i><b>Process</b></i>	<i><b>Output</b></i>
Gibson and Birkinshaw (2004)	Performance management, social context (stretch, discipline, support and trust)	Ambidexterity as alignment and adaptability.	Business unit performance.
Jansen et al. (2006)	Firm-level centralisation, formalisation, and 'connectedness' amongst members.	Ambidexterity (exploitation and exploration innovation).	Organisational unit profitability.
Kristal et al. (2010)	Exploitative and exploratory supply chain strategy.	Combinative competitive capabilities (product quality, delivery speed, process flexibility, low cost)	Profit level and market share.



Kuckertz et al. (2010)	Exploitation and exploration in high-tech start-ups.	Innovation performance	Venture performance
Lubatkin et al. (2006)	Top management team behavioural integration.	Ambidexterity (exploitation and exploration).	Firm financial performance.

Below are the recommended areas of further investigation from each of these papers:

Gibson and Birkinshaw (2004:223):

- “A promising extension of our study would be to more systematically examine the behaviours of senior executives in an effort to understand how they help create ambidexterity.”

Jansen et al. (2006:1671):

- “Future research may consider a longitudinal research design to better assess how organizational antecedents affect exploratory and exploitative innovation over time.”
- “...because our study focuses on the structural dimension of social networks, future research may examine the impact of the relational dimension of social networks.”
- “Future studies may benefit from gathering performance data that span more than one year. Moreover, it would enable analyzing performance implications at different points in time to contrast the effects of exploratory and exploitative innovations.”
- “...although our study provides new insights into organizational antecedents and consequences of exploratory and exploitative innovation, it does not address how unit managers are triggered to change levels of exploratory and exploitative innovation. It would be useful to conduct in-depth studies to better understand how change efforts initiate.”

Kristal et al. (2010:425):

- “...future research would benefit from longitudinal data to capture the dynamics in the evolution of the supply chains, and observe how these supply chains implement ambidexterity over time.”
- “Additional performance metrics, for instance, inter-organizational relationship performance can also be included in future investigations to enrich understanding of the antecedents and consequences of ambidextrous SC strategy from a network perspective.”

Kuckertz et al. (2010:185):

- “...we believe that research on the mechanisms behind the interactions of the explorative and exploitative innovation is definitely needed.” Further research advised on the role of ambidexterity in dynamic markets.

Lubatkin et al. (2006:668)

- “Only a longitudinal research design can more precisely address the question as to whether higher performance is sustainable in the face of changing competitive challenges, coupled with limited resources and the inherent difficulties in reconciling differing risk preferences, repertoires, and competencies within the same firm. Such a design would also guard against concerns over intervening phenomena during such an extended time period.”

- (2006:669): “...a comprehensive investigation of how TMT processes influence ambidexterity in SMEs and how ambidexterity influences their subsequent performance has been long overdue.”

The further research in line with these requests that this work can therefore contribute is summarised in Table 14 below:

**Table 14: Contribution to the I-P-O Literature**

<i><b>Paper</b></i>	<i><b>Further Work</b></i>
Gibson and Birkinshaw (2004)	Managerial behaviours and practices used in the creation of ambidexterity at the level of the project.
Jansen et al. (2006)	Study over time; greater investigation of social networks; exploitation and exploration under conditions of change.
Kristal et al. (2010)	Study over time; investigation of relationships in supply network.
Kuckertz et al. (2010)	Mechanisms of interactions behind exploitation and exploration. Ambidexterity under dynamic conditions.
Lubatkin et al. (2006)	Role of management team over time in influencing ambidexterity. Ambidexterity in a complicated environment.

Although the issues raised by these authors can be addressed, they do not consider the use of knowledge assets as the input. Therefore the use of intellectual capital in terms of input resources is a novel approach.

**The ‘input’ is understood in terms of *resources*, and operationalised using intellectual capital.**

### **2.10.1 Operationalisation and Research Question**

The literature can be used to operationalise the input-process-output model, and analysis shows that these provide different degrees of difficulty:

- 1) Inputs: The intellectual capital literature is readily operationalisable, given the discussion presented above. Use of HC, SC and PC in line with the IC model allows for a detailed investigation using the manager as the unit of analysis. Specifically, the research can investigate whether all six of their elements can be identified, and how they interact.
- 2) Process: There is less clarity regarding project-level exploitation and exploration, given the multiple interpretations of the terminology (e.g. Kollmann et al, 2009; Lavie et al., 2010). The interpretation of what is understood by exploitation and exploration at the level of the project is not clear from the literature.
- 3) Output: As shown in section 2.9, the assessment of the project output is challenging and subject to variation depending upon the perspective of the assessor. This is therefore more difficult to assess and not readily amenable to a simple numerical assessment. This aspect is discussed further, later, in terms of the use of performance data for case selection.

To summarise, the input-process-output approach therefore empirically links the inputs to outputs in way that has not been previously undertaken. In using the I-P-O model, the literature highlights the relative ease or difficulty in operationalising these ideas, as shown below in Table 15.

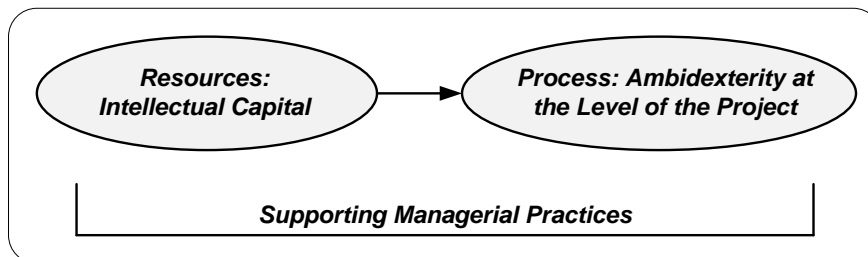
**Table 15: Input-Process-Output Approach**

	<b><i>Inputs (Resources)</i></b>	<b><i>Process</i></b>	<b><i>Output</i></b>
<b><i>Defined as:</i></b>	<i>Intellectual Capital</i>	<i>Ambidexterity</i>	<i>Project Performance</i>
<b><i>Operationalised as:</i></b>	<i>Human Capital, Social Capital, Project Capital.</i>	<i>Exploitation and Exploration at the level of the project.</i>	<i>Evaluation of performance.</i>
<b><i>Clarity of Literature Basis:</i></b>	<i>Literature readily operationalisable for the project context.</i>	<i>Less clarity regarding how this manifests at the project level.</i>	<i>Many perspectives regarding the interpretation of the output.</i>

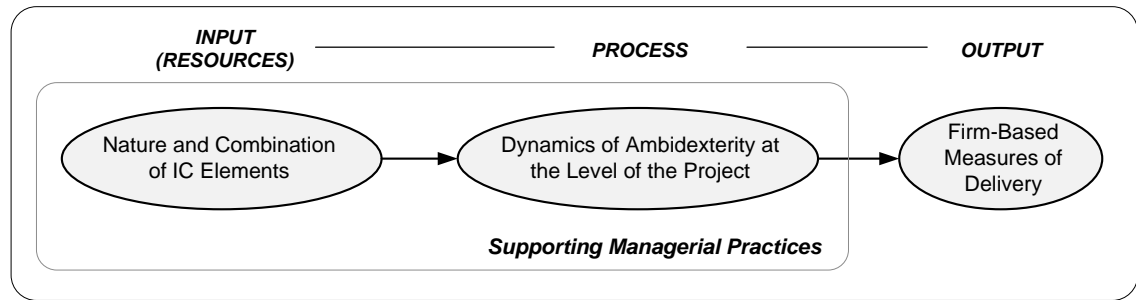
In terms of developing the research model, the linkages between the input, process and output also need to be understood. This is also in line with the recommendations from Gibson and Birkinshaw (2004), Kuckertz et al. (2010) and Lubatkin et al. (2006) as shown in Table 14.

The links between intellectual capital inputs and exploitation / exploration at the project level are suitable for investigation, since these can encompass the practices managers undertake to achieve ambidexterity. The link between exploitation / exploration and output in the project context, though, is poorly understood and the literature is unclear here. However, a key finding of this work (presented in due course) is the nature of the practices underlying the attainment of ambidexterity, found with the rich, qualitative, nature of the investigation. This provides a platform to further investigate the link between the use of these practices and various measures of project performance. This is discussed further in the conclusions.

Because of the difficulty of the process-output link, the central investigation is reflected in the initial, simpler, research model of Figure 28. This indicates the requirement to better understand the inputs in terms of resources (namely, intellectual capital) using the manager as the unit of analysis, and the process of ambidexterity at the level of the project. The managerial practices to support these aspects are unclear, and so this is a further, important, area of investigation.

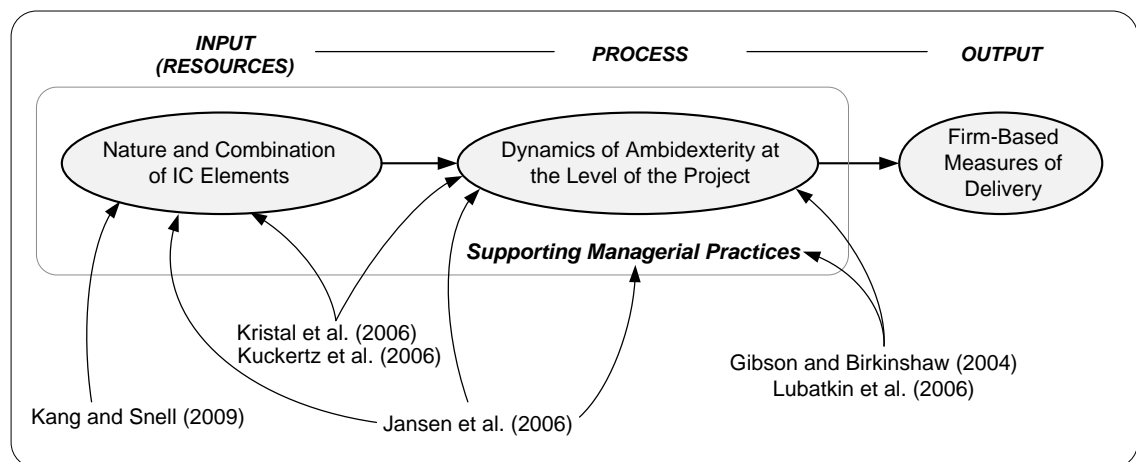
**Figure 28: Simple Research Model**

This is expanded in the model of Figure 29, showing more detail of the investigation that is required to better understand ambidexterity at the level of the project. The 'output' is included, although the difficulties of its incorporation have been discussed. It is labelled as 'firm-based measures of delivery' as this is used in the case selection process to identify the pattern of performance of different projects to gain a wider range of case data.



**Figure 29: Research Model**

This model is informed by the further work recommended by previous I-P-O studies (Table 14) and these links are highlighted in Figure 30. Note that this also includes the contribution of Kang and Snell (2009) since their model supports the theoretical conception of the input elements.



**Figure 30: Literature Supporting the Research Model**

The research will therefore seek to answer the following research question:

***RQ: ‘How is ambidexterity achieved at the level of the project?’***

As part of this, there are three sub-research-questions, linked to Figure 29:

***Sub-RQ1: ‘How are the different forms of Intellectual Capital used as inputs?’***

***Sub-RQ2: ‘How do exploitation and exploration occur at the level of the project?’***

***Sub-RQ3: ‘What management practices support the orchestration of ambidexterity?’***

The linkage of the Sub-RQs to the literature requests (as in Figure 30) is given in Table 16.

**Table 16: Literature Basis of Sub-RQs**

<b>Sub-RQ</b>	<b>Literature Basis</b>
Sub-RQ 1	Jansen et al. (2006); Kang and Snell (2009); Kristal et al. (2010); Kuckertz et al. (2010)
Sub-RQ 2	Gibson and Birkinshaw (2004); Jansen et al. (2006); Kristal et al. (2010); Kuckertz et al. (2010); Lubatkin et al. (2006)
Sub-RQ 3	Gibson and Birkinshaw (2004); Jansen et al. (2006); Lubatkin et al. (2006)

These sub-RQs are addressed using the manager as the unit of analysis. The philosophical basis, research methods and research plan are now explored further.

### 3. CHAPTER 3 – RESEARCH METHOD AND DESIGN

This chapter presents the philosophical basis, research methods and research plan. The primary research question was developed in the previous chapter following the systematic literature review of ambidexterity.

***RQ: ‘How is ambidexterity achieved at the level of the project?’***

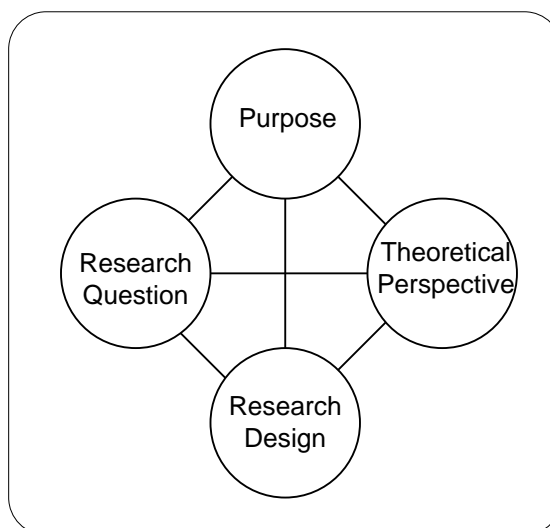
To test this, further sub-research questions were derived, based on the input-process-output model and associated literature.

***Sub-RQ1: ‘How are the different forms of Intellectual Capital used as inputs?’***

***Sub-RQ2: ‘How do exploitation and exploration occur at the level of the project?’***

***Sub-RQ3: ‘What management practices support the orchestration of ambidexterity?’***

Figure 31 shows the interplay between the four elements of research: the question, purpose, theoretical perspective and design, based on Partington (2002a:139). The RQ has been defined, the purpose has been discussed as the better understanding of ambidexterity within the project context, and this section looks at how these link with the remaining two, the theoretical perspective and research design.



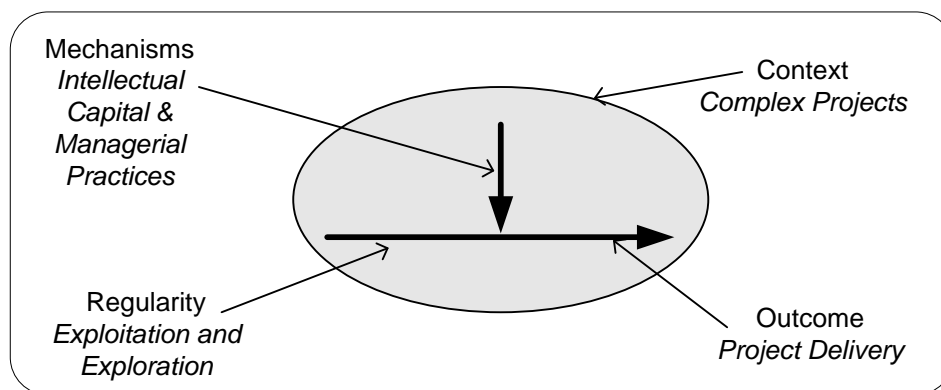
**Figure 31: Research Process (Partington, 2002a:139)**

#### 3.1 Research Philosophy

This section addresses the issues of ontology and epistemology, my position on each, and the relevant OL and project management literature that informs the discussion such that consistency is retained (Easterby-Smith et al., 2008:60). Brief linkages to the research findings are given to contextualise the approach in light of the final outcomes of the work.

Blaikie (2007:8) defines four key research strategies (inductive, deductive, retroductive, abductive). For this research, the ‘retroductive’ approach is broadly appropriate. The nature of the research question as a ‘*how*’ makes this suitable since a deductive approach is “only appropriate for answering ‘*why*’ questions” (2007:9). Retroductive strategies aim to explain observed regularities, model them and find real mechanisms by observation and/or experiment. In this case, the observed regularity is project delivery, and an input-process-output research model has been developed. However, the mechanisms (including, in this case, managerial practices) underlying *how* managers orchestrate ambidexterity are not clear.

In Figure 32, the regularity of in-project exploitation and exploration is understood to lead (at least in part) to project delivery, although the mechanisms by which intellectual capital contributes to the process in terms of inputs are initially unclear. The focus on the outcome in terms of project delivery reflects the emphasis on practice within the research.



**Figure 32: Retroductive Model (based on Blaikie, 2007:97)**

### 3.1.1 Ontology

Blaikie (2007:13), Chia (2002:2) and Easterby-Smith et al. (2008:60) define *ontology* as the philosophical assumptions about the *nature of reality*, and Denzin and Lincoln (1998) identify it as the *nature of being*. It can be considered as a continuum between *representationalism* at one end, where ‘truth’ requires verification of predictions, and *nominalism* at the other, where the interpretation of truth depends on who establishes it. The former proposes the idea of an objective reality which imposes itself on the individual and the organisation, whereas the latter suggests that the environment in which the organisation functions is the product of individual consciousness (Sims, 2005). Relativism represents a perspective in between these two, based more on a consensus between different views (Easterby-Smith et al., 2008:62).

Two major ontological positions can be traced back to ancient Greece, and the differences between the Parmenidean ontology of *being* (viewing reality as permanent and unchangeable) and the Heraclitean ontology of *becoming* (emphasising the fluxing, changing and emergent world) (Chia, 2002). Western thought has, in the main, followed this neo-Parmenidean, Newtonian view, although recent thinking has identified its deficiencies when trying to understand the management of projects. This is important with the approach being taken in this research, in that I am deliberately moving away from the ‘tools and techniques’, ‘prescriptive’, approach that is common within much of the practitioner literature.

Hodgson and Cicmil (2006a) argue against a prevailing project management ontology in which projects are ‘real’ creations that are amenable to universal laws, as does Williams (2005). Packendorff (1995:324) also argues that “The general assumption underlying the PMBoK and subsequent ambitions to create a project management profession, is that project management knowledge is applicable to all sorts of projects in all sorts of industries and environments.” Hodgson and Cicmil (2006a) consider that the naïve realist view of the proponents of the prescriptive approach is inadequate, and offer instead an ontological approach based on the concept of an evolving, constructed entity. This is also supported by Linehan and Kavanagh (2006). Specifically, they argue that a PM ontology of *being* is insufficient, and that *becoming* is more appropriate. They use Habermas’ (1971) distinction between ‘work’ (“instrumental action ‘governed by technical rules based on empirical fact’”) and ‘interaction’ (“communicative action that generates and reinforces reciprocal norms”) (Linehan and Kavanagh, 2006:54), and assert that a project is both a language and a practice. They reinforce this by arguing that the *becoming* ontology is appropriate when we consider the inherent uncertainty and ambiguity of real projects, and this is also supported by the analysis from Pellegrinelli (2011). This links back again to the concept of *execution-as-learning* (Edmondson, 2008), whereby a deliberate acceptance of uncertainty is a considerably different managerial viewpoint than one in which linear, pre-planned, execution is expected.

Blaikie (2007:13) presents the opposing ontological views as moving from the viewpoint of *realism* where the world can be observed, measured and understood objectively by a detached observer, and *idealism*, where the external world consists of representations that are creations of individual minds.

In the research presented later, these ideas are realised. In the case studies used in the second phase of data collection, the case sampling is performed with Company data, using financial performance metrics as the basis of case selection. However, from the subsequent interviews with managers, it becomes clear that the high-level performance data hides the complexity and difficulty of day-to-day operations. The lived reality of the managers revealed in the interviews gives a far richer picture of the nature of their project work. Primacy is given to the details they convey, with less weight given to the performance data, which masks the mechanisms underpinning the work. From the detailed interview data, key underlying managerial practices are derived to better explain the orchestration of ambidexterity at the level of the project.

The concept of *idealism* (above) can be brought out using the case study data in Chapter 5. Here, as is discussed later, managers on the same project offer different views of the complexity of their project and of the critical incidents they encounter (sometimes despite sharing the same office) and this is a key finding from the research. So although a realist approach accepts the financial metrics and performance data that form the basis of the weekly reports, targets and contractual obligations, this is insufficient to explain the ‘*how*’ that is the basis of the research question. By accommodating the multiple truths of those involved, I gain a greater understanding of the manifold perspectives of ‘the project’. Indeed, it is this that informs another of the findings from the case work, in that a single shared view of project-level exploitation and exploration may not be a realistic expectation.

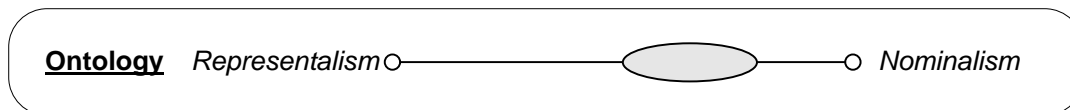
My ontological position has been shaped by my experience of the world, specifically, twenty years in engineering (a discipline with a strongly prescriptive, positivist approach). The last ten years of these, however, were in management positions, which emphasised the importance of the social and person-based



approach to the organisational environment. The research presented is based upon my interest in, and experience of, the issues raised regarding the nature of the management of projects.

An ontological perspective valuable for this work is that of the *depth realist*. This ontology consists of three domains: “the *empirical* domain is the world we experience with our senses; the *actual* domain includes events whether anyone is there to experience them; and the *real* domain consists of the processes that generate events.” (Blaikie, 2007:16). Chia (2002:11) provides a useful example of this, in that the lighting of a match is not simply a response to it being struck, but the true causal explanation requires an understanding of the generative mechanisms, including the underlying chemistry and the surface roughness. Blaikie (2007:16) refers to the “stratification of reality”, and this is broadly consistent with the use of a multi-level intellectual capital model that seeks to unpack and explain the ‘how’ of ambidexterity.

Considering ontology on a continuum between representalism and nominalism (Easterby-Smith et al., 2008:62), my position is broadly central, although with a stronger tendency towards nominalism, as shown in Figure 33.



**Figure 33: Ontological Position**

### 3.1.2 Epistemology

Easterby-Smith et al. (2008:60) define epistemology as the “[g]eneral set of assumptions about the best ways of inquiring into the nature of the world”, and Blaikie (2007:18) identifies it as “a theory or science of the method or grounds of knowledge.” Jankowicz (2004:108) refers to it as a “personal theory of knowing”, whilst Chia (2002:2) writes that it is “how and what it is possible to know.” Easterby-Smith et al. (2008:62) show a continuum of epistemologies from *positivism*, where facts are concrete, to *social constructionism*, where they are human creations. In positivism, Chia (2002:7) writes, “the researcher is a ‘spectator’ of the object of enquiry”. Easterby-Smith et al. (2008:58) define social constructionism as where “‘reality’ is not objective and exterior, but is socially constructed and given meaning by people.” Again, relativism is in between, where facts depend on the viewpoint of the observer.

Blaikie (2007) offers a more detailed discussion of epistemological options, and also their general relationship with the researcher’s ontological position. Empiricism is associated with a realist ontology, in that it assumes an objective, measurable reality, in line with the natural sciences. Chia (2002) identifies this as the *Aristotelian* view, relying on personal experience and observation, in contrast to the *Platonist* perspective, based on rationalism, with the emphasis on logic and reason. Chia (2002:6) summarises “Rationalists are concerned with abstract principles, whereas empiricists privilege facts.”

Whilst empiricism can explain regular patterns in data, this is insufficient in determining the deeper, causal mechanisms. The epistemological position of *neo-realism* is associated with the depth realist ontology, where “a scientific theory is a description of structures and mechanisms which causally generate the observable phenomena, a description which enables us to explain them” (Blaikie, 2007:22).

Neo-realism assumes an external, independent reality, although the domain of the *real* is assumed to drive effects in the *empirical*, or surface, domain.

The epistemology discussions from the organisational learning literature are pertinent, since this aspect needs to be aligned with the research.

### 3.1.2.1 The Epistemological Aspects of Learning

Although we may broadly conclude that direct learning does take place in the minds of individuals within an organisation, the earlier discussion shows that this is a very limited conception. The social context is important in understanding both how the organisation benefits from individual learning (Holmqvist, 2009), and how individuals learn from and within the organisation in which they are situated (Brown and Duguid, 2000) (see also Antonacopoulou, 2006). This line of enquiry started in the early 1990s and explored the social aspects of learning. This found two significant aspects: the importance of socially situated learning, and also the concept of learning as social practice (Gherardi, 2000).

Brown and Duguid (1991) use Orr's ethnographic studies of repair technicians to distinguish between the canonical practice that the organisation documented in its procedures, and the rich, detailed non-canonical practices that represent how work is actually done. Here learning is through social contact and storytelling (see also Morris and Oldroyd, 2009), as the solutions to problems are shared amongst the group. We can understand work in terms of *collaboration*, *narration* and *improvisation* (Brown and Duguid, 2000:104), where learning is emphasised as a socially-situated process with an emphasis on action and results. Tsoukas (2005:6) argues "The study of how practitioners know, think and act requires a non-traditional mode of enquiry that embraces human creative agency, and acknowledges its inevitable historicity and its fundamental embeddedness in social practices."

Wenger and Snyder (2000:139) brought the concept of *communities of practice* to a wider audience, describing them as "groups of people informally bound together by shared expertise and a passion for joint enterprise" (see also Wenger, 2000). Managers can also try and harness these to gain the benefit of their power (McDermott and Archibald, 2010). Mintzberg (2009) supports the idea of fostering a community spirit, emphasising "communityship" rather than excessive reliance on leadership. Lindkvist (2005) extends this to consider the project domain, and argues for knowledge 'collectivities' rather than communities. Weick and Roberts (1993) suggest that 'group mind' may take the form of cognitive interdependence focussed around memory processes. They argue that people in close relationships enact a single transactive memory system, complete with differentiated responsibility for remembering different portions of common experience. People know the locations rather than the details of common events and rely on one another to contribute missing details that cue their own retrieval. Tsoukas (2005:100) writes "Being an emergent phenomenon, the collective mind is known in its entirety to no-one, although portions of it are known differentially to all." The role of practice is required to keep this knowledge refreshed. Antonacopoulou and Chiva (2007:290) write "OL could be defined as 'the flow of learning possibilities derived from the multiplicity of connections practitioners in community engage with, as they constantly reconfigure their (learning) practices.'"

This social practice approach is an important way of understanding how projects are executed. Tsoukas (2005:111) advises "Given the distributed character of organisational knowledge, the key to achieving coordinated action does not so much depend on those 'higher up' collecting more and more knowledge, but on

those 'lower down' finding more and more ways of getting connected and interrelating the knowledge each one has. A necessary condition for this to happen is to appreciate the character of a firm as a discursive practice: a form of life, a community, in which individuals come to share an unarticulated background of common understandings. Sustaining a discursive practice is just as important as finding ways of integrating distributed knowledge." I concur with this view, and it informed my understanding of the responses from the interviewees, aiding in appreciating the richness of their experiences. The common background is the project in which the individuals participate, even though they may have different role- or task-based perspectives.

Marshall (2008:418) summarises this view: "The strength of practice-based approaches is that they strive to offer an holistic understanding of knowing and learning as dynamic, emergent, social accomplishments that are actively situated within specific contexts of practice. Consequently, they are able to counter some of the tendencies observed earlier in cognitive approaches towards depicting knowledge and learning in static, dualistic, internalized and ultimately individualized terms. The emphasis is on the socially constituted, indeterminate, revisable and negotiated character of knowledge." This view offers a perspective of how the learning embedded in organisational routines is enacted. Gherardi (2000:213) writes "Operational knowledge in organizations exists at a tacit level, and organizational routines are the carriers of such knowledge." She offers this perspective as a counter to the strongly realist ontology of learning offered by other scholars (Gherardi, 2001). This provides a convincing and powerful link between the literature of 'learning as routines' and that of 'situated learning'.

The social constructionist view taken by some researchers provides a very different perspective from the idea that learning occurs within individuals. It therefore occurs in the day-to-day interactions between people during their work (Argote et al., 2003; Blackler, 1993; Brown and Duguid, 1991; Cook and Yanow, 1993; Easterby-Smith et al., 2000; Lave and Wenger, 1991; Nonaka, 1994; Starbuck, 1992). Growth of capability through group expansion may be understood through the concept of 'legitimate peripheral participation' (Lave and Wenger, 1990, in Brown and Duguid, 1991), where new members learn to behave within the community. There is a socialisation process whereby individuals learn the ways of the group, and community learning and organisational learning are reciprocal (Wang and Ramiller, 2009). This also allows accommodation of the interconnectivity between different levels of learning as a complex social process (Antonacopoulou, 2006; Antonacopoulou and Chiva, 2007). For a review of group-level learning, see Wilson et al. (2007).

The epistemological shift between the individual-centred view and the social conceptualisation was identified by Cook and Brown (1999). They argued: "We call this understanding the 'epistemology of possession' since it treats knowledge as something people possess. Yet, this epistemology cannot account for the *knowing* found in individual and group *practice*. Knowing as action calls for an 'epistemology of practice.'" (Cook and Brown, 1999:381, emphasis in original). Orlikowski (2002) also highlights that organisational learning is inseparable from constituting practice, and Vera and Crossan (2003:126) distinguish *knowing* as behavioural *knowledge-as-action*. Here it is also valuable to consider the concept of *phronesis*. Antonacopoulou (2010:S7) writes that "phronesis is about the knowledge that defines the way we formulate our intentions and the course of action for achieving these intentions. Central to phronesis is practising as we search continuously to exercise practical/prudent judgements (or wisdom) when being purposeful in defining and pursuing particular objectives." This 'practical wisdom' (Tsoukas,

2005:220) enlightens our understanding of managerial actions, and a qualitative approach is appropriate to capture its richness. As Antonacopoulou and Chiva (2007:287) argue, a positivist epistemology “fails to capture the multiple modes of knowing as social actors interact” since it should be considered as a “dynamic emergent process” (2007:286).

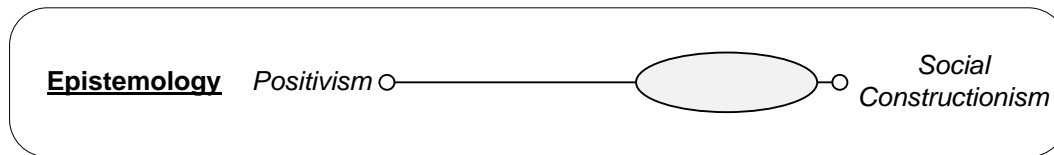
Tsoukas (2005:104) identifies that social practices can be viewed as consisting of three dimensions. Firstly, the social position or *role dimension*, the normative expectations associated with the carrying out of a particular role. Secondly, the *dispositional dimension*, the system of mental patterns of perception, appreciation and action which has been acquired by an individual via past socialisations and is brought to bear on a particular situation of action (Bourdieu’s ‘*habitus*’). Finally, the *interactive-situational dimension*, the specific context of a social activity within which the normative expectations and the *habitus* are activated. These ideas both informed and are brought out in the case study evidence in Chapter 5, in which patterns of ambidexterity arise based on managers’ roles, experiences and incidents that occur within the work.

In summary, the social and practice perspectives are important in the study of ambidexterity. In the project domain, this can be compared to Edmondson’s (2008) concept of *execution-as-learning*, where the action of working, and therefore learning, can be understood in this manner. From an epistemological perspective, it is therefore relevant to encompass *knowing* as well as *knowledge* in considering the mechanisms of execution in project work. Since project work is generally associated with tasks and outputs, often in a team or multi-team context, this epistemology allows the concepts of learning and action to be considered together and is important. It is therefore emphasised that ambidexterity is considered in terms of active practice, rather than simply from a viewpoint of passive knowledge accumulation.

### 3.1.2.2 Epistemological Position

The epistemological stance taken must be in line with the overall research process. As highlighted in the literature review, the majority of the empirical research to date has taken a positivist approach, emphasising the ‘what’, and there are fewer qualitative studies addressing the ‘how’. Hence, a qualitative approach is to be taken to gain a richer understanding of the subject of ambidexterity, emphasising the underlying ‘how’ of the research question.

A qualitative approach is suitable for addressing the issues in question. Specifically, human capital represents individual knowledge, encompassing both objective, explicit, knowledge accumulation, as well as tacit knowledge gained through experience (Nonaka, 1994). Informal networks and relationships, trust and the socially constructed meanings inherent in day-to-day work form an important part of this research in the form of social capital, and the incorporation of these ideas benefits from an interpretivist slant to acknowledge their contribution. Finally, project capital, and the broader organisational capital, also encompasses a range of knowledge forms. The terminology covers informal and tacit routines, together with formal and explicit procedures, as well as the technology and processes used (Swart, 2006). Considering all these aspects again highlights the benefit of adopting an interpretivist viewpoint, although it is acknowledged that this could be further expanded by the use of positivist techniques. From this discussion, it can be seen that my epistemological position in Figure 34 has a stronger tendency towards the social constructionist position.



**Figure 34: Epistemological Position**

### 3.1.2.3 Constructionist Epistemology in the Project Management Literature

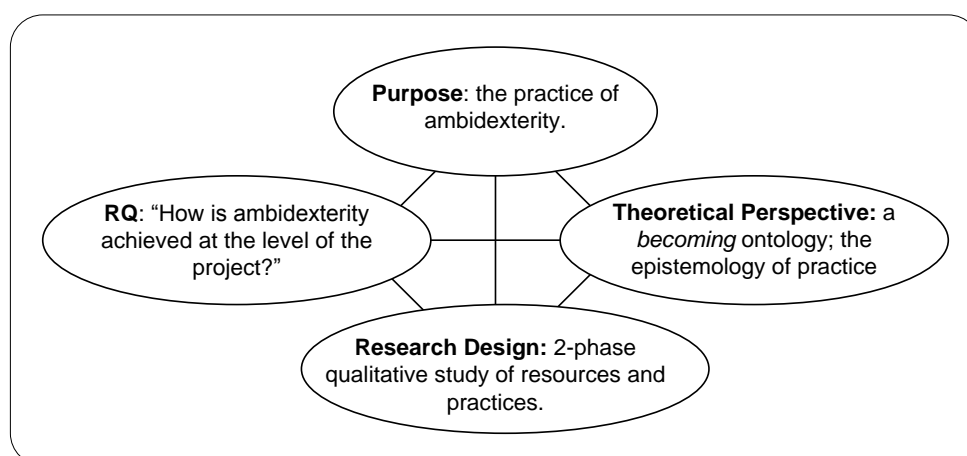
This type of epistemological thinking is also making its way into the project management literature (see Cicmil and Hodgson, 2006) from a background dominated by positivist, prescriptive, techniques. Indeed as Alvesson and Deetz (2000:6, cited in Hodgson and Cicmil, 2006:12) argue, positivism is inadequate in trying to understand complex organisational reality. Balancing this perspective with a social constructionist view allows greater understanding of the subject. Bresnen (2006) also highlights the relevance of *knowledge-in-action* rather than relying only on a prescribed body of knowledge in projects, so knowledge is informed by practice as well as theory. Deeper practitioner learning through reflection and development is also highlighted by Crawford et al. (2006b). In line with this, Cicmil et al. (2006) recommend following a *becoming* ontological approach in research, to identify the lived experience of practitioners and understand Heidegger's "'involved-in-the-world' manager" (2006:676). They also advocate a knowledge-in-action epistemology, to incorporate the notion of 'praxis', where action is based on context-dependent judgement.

In summary, I acknowledge a range of epistemological views in this work, but the key interpretation is that knowledge and learning in the context of this study are related to the action and practice of the project participants. Ambidexterity is understood to be of value in the activity of the project actors in the overcoming of issues, completion of tasks and fulfilment of their roles. Knowledge refinement and creation can be understood as a necessary response to the lived reality of complex projects, since the application of static knowledge is insufficient. This is in line with Arrow (1962:155), who argues for the conception of learning in terms of problem-solving.

It is notable that the ambidexterity literature does not focus significantly on managerial practices in terms of understanding this 'how'. Antonacopoulou and Sheaffer (2010:2) write that "[p]ractising is defined as *deliberate, habitual and spontaneous repetition* reflective of the dynamic process of becoming based on rehearsing, reviewing, refining, and changing practices and the relationships between them" (emphasis in original).

I therefore conceive of the subject both as *learning-as-practice* (see Edmondson, 2008) and also in conjunction with the growing literature of *strategy-as-practice*. Jarzabkowski and Spee (2009:70) view strategy-as-practice as "a situated, socially accomplished activity, while strategizing comprises actions, interactions and negotiations of multiple actors and the situated practices that they draw upon in accomplishing that activity." They consider the research in terms of the *practitioners* (those that 'do'), *practices* (the way it is done) and *praxis* (the flow of activity by which it is accomplished), and this literature attempts to understand how micro-level actions and phenomena influence macro-level performance and outcomes. This approach is also valuable in studying ambidexterity (i.e. the investigation of *ambidexterity-as-practice*), but as yet has not been part of the agenda within the field. Consequently, for the purpose of this research, an approach of investigating *ambidexterity-as-practice* is taken.

This is reflected in the analysis of the data collected during the research. Using the qualitative data, an interpretivist approach is taken in analysing the initial manager interviews (to assess the nature and interaction of the intellectual capital and its relationship with exploitation and exploration), and this generates powerful insight into their interaction that has not been shown with positivist means. Similarly, in the case study analysis, the multiple viewpoints of the respondents are interpreted and used to generate a model highlighting the managerial practices enabling ambidexterity at the level of the project. Again, these are findings that offer a different insight from the positivist studies performed to date, although the identification of specific practices may prove a suitable basis for further surveys and subsequent quantitative analysis.



**Figure 35: Research Process Detail (Partington, 2002a:139)**

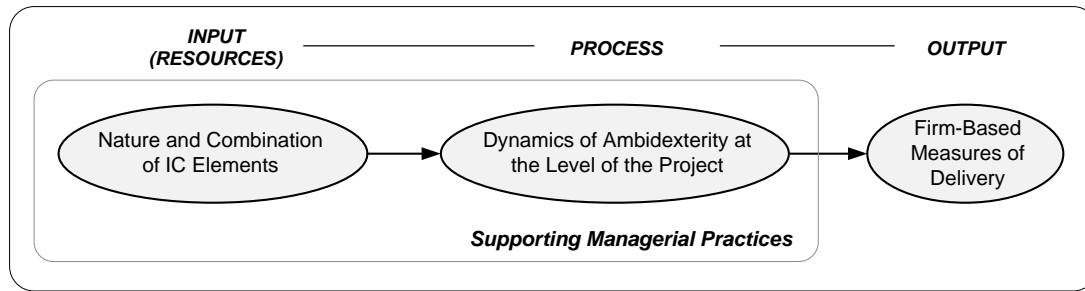
This is summarised in Figure 35, in that the four elements of Figure 31 are expanded to highlight the positions discussed above, indicating the alignment of the approach. The 'how' research question is addressed with a *becoming* ontology and an epistemology of practice, using a two-phase qualitative approach that acknowledges the social complexity of the context (Antonacopoulou and Chiva, 2007).

### 3.2 Research Design

In balancing the research design with the purpose, question and theoretical perspective (back in Figure 31), it is acknowledged that this is an iterative process. However, whilst it is accepted that this iteration can result in changes, the four elements must remain self-consistent.

#### 3.2.1 Operationalising the Research Model

In this section the I-P-O model is examined in the context of the management of projects, using the project as the level of analysis, with the manager as the unit of analysis. The research model is repeated in Figure 36. Details of each of the elements can thus be considered in terms of practical operationalisation.



**Figure 36: Research Model**

### 3.2.1.1 Inputs – ‘Managers in Projects’

In assessing the knowledge assets as inputs, especially the perspective of human capital and social capital, the diverse range of project participants presents a difficulty if we attempt to comprehend the entirety of the project. Ideally, a wide range of project participants would be targeted, and a detailed picture of ‘project knowledge’ developed by summing their responses. If the project encompasses multiple disciplines, departments and locations, potentially also multiple firms or consortia, achieving an adequate understanding of these views would not be realistic proposition. If the project were to contain hundreds or even thousands of actors, this task would be overwhelming to undertake, and the chances of such a methodology being successful is low. An additional difficulty to consider is that in a multi-project study, the nature of the projects may vary, and with it the type of staff. Hence determining and comparing a representative set of responses becomes harder.

Therefore using a comprehensive range of project respondents will not be attempted, instead, the ‘project managerial role’ is used with a knowledgeable individual (or several individuals) able to answer on behalf of his or her project. This has the advantage of offering (ostensibly) a representative knowledge of the whole project, and does not suffer from the difficulty of attempting to reconcile multiple diverse perspectives from a number of heterogeneous projects. The terminology of ‘project manager’ is reasonably well understood in practice, although may be substituted for alternative terminology in some organisations. The purpose of the choice is to identify an individual (or multiple individuals) responsible for project execution and delivery, and most likely to be able to answer on behalf of the project. The disadvantage is that a single respondent may be answering for the project (or sub-project) that is his or her responsibility, and therefore the risk of bias must be considered (Podsakoff and Organ, 1986). However, the use of a single, knowledgeable respondent (such as a CEO or senior manager) is in keeping with much of the empirical ambidexterity research cited here, and thus is consistent with previous investigative work within this field.

Note that in Phase 1 of the research, the managerial role is examined, whereas in the Phase 2 case studies, multiple managerial respondents per project are interviewed to gain a wider managerial perspective. The roles used in both research phases are those of *managers in projects*, rather than purely that of a single *project manager*. The management of a project is not necessarily the responsibility of only one individual, but can have a distributed aspect. For example, the PM may report to a programme manager, and also have the technical manager and team leaders reporting to him / her. Each therefore takes responsibility for certain aspects of the management, and each may have a part to play in exploitation and exploration. This is discussed in detail in terms of the research results.

In selecting this response strategy, the research design necessarily focuses more heavily on the role of the manager and their practices. This in itself is a valuable perspective, since there is a lack of research linking project team management practices to outcomes (Scott-Young and Samson, 2008) despite investigations into the area (Kloppenborg and Opfer, 2002). Belout and Gauvreau (2004) build on the model of Pinto and Prescott (1988) yet argue that HRM studies in the context of project management are still “very rudimentary” (2004:1). Scott-Young and Samson (2009) show that project manager continuity and incentives are linked to project success, but this is a far from complete understanding of the role. Slevin and Pinto (1987) argue that the project manager must balance strategy and tactics, and indeed advocate that (1987:33) “the manager is of necessity a generalist as well as a specialist: he or she must know how to *plan* effectively and *act* efficiently” (emphasis in original). Similarly, Lewis et al. (2002) advise that product development may require managers to use emergent and planned activities concurrently, and utilise different management styles as changes occur. Barker (2010:57) argues that the manager is an integrator, and “is responsible for bringing together many inputs ... the manager’s focus may change significantly and unpredictably from one day to the next.” This must be balanced with the requirement to master the specific technical aspects of project management in order to be effective (e.g. PMI, 2008). This adds weight to the argument that testing these ambidextrous forms of HC is a valuable exercise.

In terms of how the project manager can respond to the IC constructs discussed, the HC and SC responses are understood to be at the *individual* level. At the project capital level, the project processes used (mechanistic, organic) should be the responsibility of the manager (who should be instrumental in defining them), and therefore answering at the *project* level is appropriate for this construct.

### **3.2.1.2 Process – Ambidexterity at the Level of the Project**

Exploitation and exploration at the project level are appropriate for the manager to evaluate. Within the context of projects, *exploitation* therefore refers to incrementally modifying behaviour based on experience, previous projects and client feedback, utilising and modifying project processes and lessons learned and capturing ongoing learning to feed into the next stage, bringing in knowledge from existing networks, and so forth. In line with March’s (1991) definition used earlier, the exploitative aspects are therefore to be interpreted as the *knowledge refinement activities*.

*Exploration* can include such ideas as responding to project-specific issues, experimenting creatively with new ideas and innovative problem-solving, flexibly tailoring solutions, changing processes, and actively seeking new knowledge from fresh sources. They are to be interpreted as the *knowledge creation activities*. At the respondent level, the manager should be well-placed to identify and evaluate these processes in terms of project activities.

At this stage, though, these concepts are necessarily vague and the terminology does not lend itself to a tightly-bounded understanding. As part of the work, therefore, a more context-specific understanding is required. The respondents are the managers responsible for the exploitation and exploration activities, highlighting the practical nature of the investigation and its relevance to managerial practice. The intention for the qualitative interviews (described shortly) was to identify how managers interpret these ideas and to therefore add greater clarity to the language of exploit / explore.



### 3.2.1.3 Output – Project Delivery

As highlighted, an evaluation of project outcomes and project management is challenging and a source of ongoing debate within the literature. Outcomes can be subjective, different stakeholders may have different views of success, and even a well-run project can be derailed by factors outside the control of the managers. Caution is therefore required in identifying the exploratory and exploitative practices that aid delivery. Additionally, to allow investigation as projects progress, the use of the term 'outcome' is to be interpreted as an evaluation of the project delivery against the original plan.

As discussed in the case sampling section later, the 'outcome' aspect was used as a primary determinant in choosing representative projects as case studies, based on performance measures. However, although the sampling was based on extensive internal organisational data, the responses from the managers showed that this was too simple a conceptualisation. In determining the benefit of the identified managerial practices and their contribution to project delivery, primacy was given to the qualitative evidence since the financial performance data did not fully reflect the activities leading to the project delivery. This is discussed at length, later in this thesis.

### 3.2.1.4 Contribution of This Approach

This approach addresses issues voiced by numerous authors, in addition to the I-P-O literature back in Table 13. Gupta et al. (2006), together with Raisch and Birkinshaw (2008) highlight a lack of micro-level analysis of exploration and exploitation and advocate studies spanning multiple levels of analysis (see also Raisch et al., 2009). Simsek (2009) recommends a longitudinal approach to understand the temporal dynamics of ambidexterity, whilst Raisch and Birkinshaw (2008:401-2) write that "[f]uture research should investigate how organizations adapt and develop ambidextrous structures, contexts, and leadership patterns over time to respond to varying boundary conditions." This research is intended to facilitate a greater understanding of how ambidexterity is operationalised in the project context, since this an underexplored area (Geraldi et al., 2011a).

This research also addresses a significant and important gap raised by Raisch and Birkinshaw (2008:397) "Even less is known about contextual ambidexterity: Research has so far been limited to a few studies (i.e., Gibson & Birkinshaw, 2004). In this approach, ambidexterity is rooted in an individual's ability to explore and exploit... With the notable exception of Mom et al. (2007), there is a complete lack of research into ambidexterity at the individual level of analysis. Detailed case studies, as well as broader field studies, could help to further substantiate our understanding of contextual ambidexterity." This approach is echoed by Güttel and Konlechner (2009:169) who advise that "contextual ambidexterity can also be connected to different development stages of an organization between the poles of loose structures during the start-up phase and the increasing role of tight structures in the subsequent phases. Research could investigate the use and appropriateness of different ambidextrous designs in diverse development stages of organizations... [M]ore qualitative as well as quantitative research on this issue is necessary."

The project-based research allows this approach to be addressed (as advocated by Tiwana, 2008). Raisch et al. (2009:693) advise that "studies that take a longitudinal perspective of organizational ambidexterity are scarce". Consideration of the duration of the whole project lifecycle (to be discussed later) is not full longitudinal testing, yet it goes toward addressing this issue.

### 3.2.2 The Qualitative Approach

A qualitative approach is being used to gain a richer understanding of the 'how' of ambidexterity. However, despite the increasing use of qualitative methods (Sandberg, 2005), there is still ambiguity over the exact meaning of the word 'qualitative' (Cassell et al., 2006; Cassell et al., 2009; Johnson et al., 2006) and how to assess its quality (Bryman et al., 2008; Pratt, 2008; Savall et al., 2008). As Van Maanen (1979:520) advises, "[t]he label qualitative methods has no precise meaning in any of the social sciences. It is at best an umbrella term covering an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world."

The qualitative approach does not seek the statistical rigour of quantitative analysis, and therefore the techniques incorporated should not be concerned with "physics envy" (Symon et al., 2000:458). Whilst qualitative field research, such as interviews, benefits from generation of highly realistic data, it is relatively uncontrolled in comparison with simulations or experiments (Snow and Thomas, 1994). Pratt (2009:856) writes that "[q]ualitative research is great for addressing 'how' questions - rather than 'how many'; for understanding the world from the perspective of those studied (i.e., informants); and for examining and articulating processes." Edmondson (2002:131) also advises that "[q]ualitative research is a useful methodology for investigating phenomena that are not well understood". It is therefore a suitable research approach given the research question.

Although there may be a perceived credibility problem for researchers using qualitative methods (Madill et al., 2000), Cassell et al. (2006:163) disagree, arguing "[i]ndeed, commentators have argued that the outputs of qualitative research may be of more relevance than those of traditional methods." Mintzberg (1979:587) also writes, "while systematic data create the foundation for our theories, it is the anecdotal data that enables us to do the building. Theory building seems to require rich description, the richness that comes from anecdote. We uncover all kinds of relationships in our 'hard' data, but it is only through the use of this 'soft' data that we are able to 'explain' them." This is also advocated by Sandberg (2005:44), who comments that "[m]any advocates of interpretive approaches have questioned not only the use of positivistic criteria but also the research goal of achieving objective knowledge and truth."

The validity of qualitative research is therefore significant. Sandberg (2005:51) addresses this: "A central implication of truth as intentional fulfilment is that truth claims are dependent on the researcher's understanding of the research object. This does not mean that truth becomes purely subjective... everyone is situated in a specific historical, cultural, and linguistic understanding of reality, which is internalized through upbringing, education, and work. The internalized understanding becomes to a large extent our framework for making sense of reality." The role of the researcher and the interpretation of data are therefore central, and familiarity with the context is valuable as "[r]esearch participants usually do not describe their lived experience in an undistorted way" (Sandberg, 2005:56). He describes this approach as one of 'pragmatic validity', and elaborates: "Because researchers cannot escape their interpretations, one appropriate criterion of reliability in researching lived experience is the researcher's interpretive awareness... To maintain an interpretive awareness means to acknowledge and explicitly deal with our subjectivity throughout the research process instead of overlooking it. This form of reliability can be discussed in terms of Kvale's (1996)

notion of “biased subjectivity” and “perspectival subjectivity.” Biased subjectivity simply results in unprofessional work. As Kvale argued, biased researchers principally take note of statements that support their own opinions, selectively interpret statements so they can justify their own conclusions, and tend to ignore counterevidence. In contrast, researchers exercising perspectival subjectivity are more aware of how their own interpretations are influenced by the particular disciplinary, theoretical, and methodological perspectives taken in the study. Thus, interpretation then becomes a strength rather than a threat to reliable results.” (Sandberg, 2005:59).

Taking this into account, my experience and familiarity with the management of projects is an integral part of the research process, and often this is lacking in research output. Easterby-Smith et al. (2008a:423-4) comment: “Yet in the ‘Method’ sections of published articles, we often see an emphasis on quantity of data collected rather than on proximity to the life worlds of those studied. Statements emphasize researcher objectivity and independence from the phenomena they are studying rather than indicate how closely engaged they were with the social setting and its members to understand their perspectives, and research procedures are presented as a linear rather than an open-ended, iterative, and contingent process. Presenting these cues in accounts of the research process not only invites inconsistent readings and evaluations of the work, but they also misrepresent key quality-making practices.”

As Johnson et al. (2006:132) advocate, “[q]ualitative research... entails capturing the actual meanings and interpretations that actors subjectively ascribe to phenomena in order to describe and explain their behaviour through investigating how they experience, sustain, articulate and share with others these socially constituted everyday realities.” I achieved this through an understanding of the context of the project managers, based on my experience of such work, since it is important to acknowledge the role of the individual in the researcher (James and Vinnicombe, 2002). As Fendt and Sachs argue, (2008:442) “If the very validity of qualitative inquiry is interpretation and understanding of the social world, why should the researcher neutralize himself or herself and be reduced to the role of an accountant of a mechanistic procedure? Similarly, if the validity of qualitative inquiry is interpretation and understanding, why should the researcher suppress his or her knowledge and experience?” Sandberg (2005:51) also supports this use of the researcher’s knowledge in the process “Following Heidegger, the researcher would not only observe the hammer but also actively use it, hammering with it in practice. Hence, from a Heideggerian perspective, it is first in the researcher’s lived experience of using the hammer in practice that he or she can achieve true knowledge of what a hammer is.”

### **3.3 Research Design**

The research design is shown in Figure 37, below, which was developed with a large IT-services organisation that is participating in this work. The literature review has been presented here, together with the research model. In order to investigate the linkages between the resources (knowledge assets), ambidexterity at the project level, and outcomes, a qualitative methodology was proposed to obtain richer data regarding the ‘how’ of ambidexterity.

The research plan was developed to cover two key areas:

1. Firstly, interviews with managers to establish the validity of the research model, namely to identify if the 'six-box' intellectual capital model is valid in the context of the management of projects and how it operates, and also to identify whether exploitation and exploration (i.e. ambidexterity) can be identified at the project level. This has not been explicitly investigated in the empirical literature, and therefore these ideas require validation, amendment or rejection.

This addresses Sub-RQ 1 and 2:

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

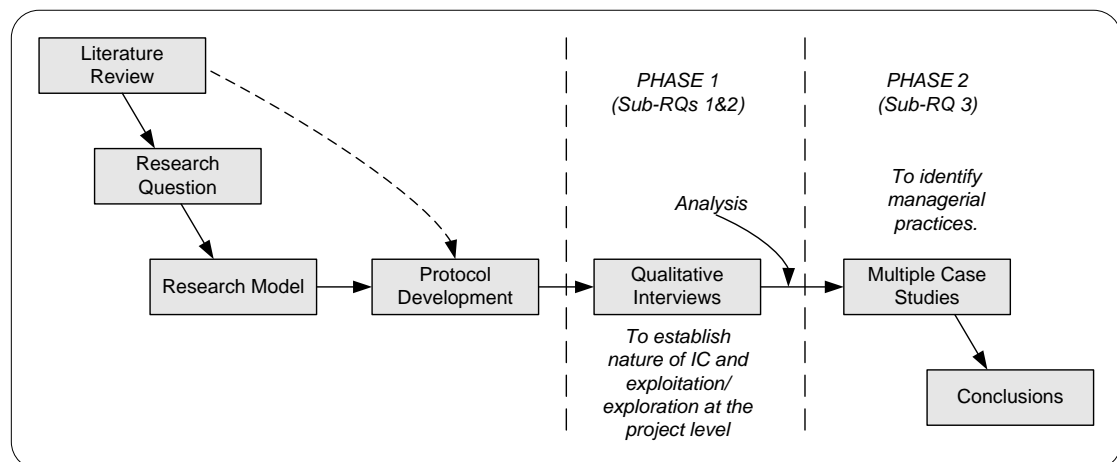
***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

2. Secondly, multiple case studies were planned to further investigate how ambidexterity may be understood over the duration of the project and to better understand the reality of how project-level ambidexterity is managed.

This addresses Sub-RQ 3:

***Sub-RQ3: 'What management practices support the orchestration of ambidexterity?'***

The broad plan is indicated in Figure 37, and this is now described in detail.



**Figure 37: High-Level Research Plan**

### 3.3.1 The Study Organisation

The research was performed within a large multinational IT-services organisation. This organisation is part of a larger technology-based Company selling both products and services across the world. They have over 300,000 employees in total (approximately 50,000 in the IT-services division, with 15,000 of those in the UK), with total revenue in excess of US \$100 billion per annum. The services arm provides a wide range of application development, infrastructure, business process management and other outsourced services to industrial and commercial corporations and public sector bodies. The Company also manages major projects and programmes in conjunction with, or on behalf of, their clients.

The research documented here was undertaken with UK-based employees in the IT-services division. Although my background is in the management of technology development projects, IT-services is a slightly different area. I do not work for, and have not worked for, the study organisation and the lack of ties may aid in retaining greater objectivity in the analysis.

The context of the projects undertaken by this organisation generally resembles that as shown back in Figure 27, where they (as the supplier) work for numerous large clients and each client is serviced by an account structure. Accounts operate relatively autonomously, and often take over the employment of staff in the client organisation. Therefore, if they win a contract with a new customer, staff are likely to be transferred to the Company, although they are still providing services to the same end user. This happened in some of the cases presented later, where employees previously worked in the particular sector, and were then moved to a new employer, despite still performing essentially the same functions. Their allegiance and professional identity appeared to still be to their context and, for example, the healthcare staff had little knowledge of, or association with, the teams in defence (and vice versa) despite all belonging to the same employer.

Within each client-provider relationship, there are generally multiple projects and/or programmes within the account. Studying this organisation allows access to numerous industry areas, so although their business is providing IT services and IT-enabled change, this may be performed within a number of industries, as will be discussed.

### 3.3.2 The Two Research Phases

Having developed the research model, Phase 1 of the research was to investigate the concept of orthogonal intellectual capital utilisation and the nature of exploitation and exploration using the manager as the unit of analysis. This required validation since, as shown, the area had not been explored qualitatively in previous empirical studies.

This addresses sub-research-questions 1 and 2:

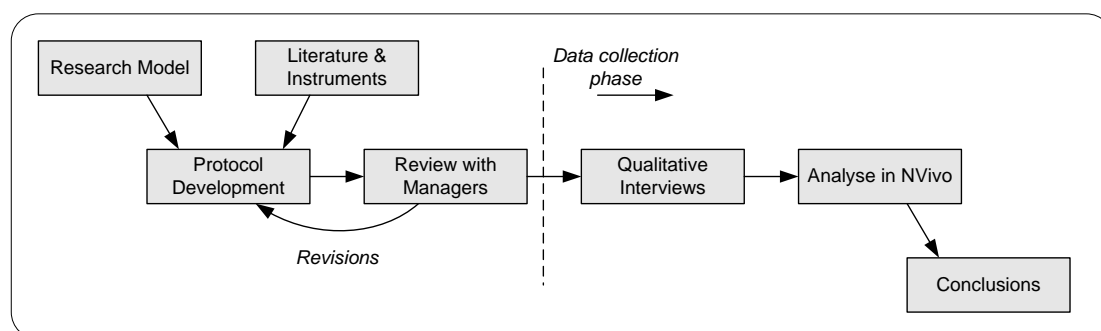
***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

As indicated in Figure 37, this was to be achieved via developing an interview protocol to identify and evaluate the aspects of intellectual capital, together with the exploitation and exploration process and their effectiveness, using a selection of managers.

### 3.3.3 Phase 1 Research Design

An overview of this phase is given in Figure 38. The initial research was intended to test the extension of the intellectual capital model whereby all six of the IC elements are identifiable in the context of exploitation and exploration using the manager as the unit of analysis.



**Figure 38: Phase 1 Research Design**

To this end, the interview protocol development was planned to be an iterative process using previous literature as an initial guide, but refined by reviews with academics and managers to check for style and language use within the context of the organisation in which it was to be used.

The main data collection phase was designed to interview managers in a range of different industrial environments in multiple locations, to attempt to broaden the generalisability, rather than to focus on too narrow a sector or organisation which might have unique characteristics unrepresentative of the wider profession. Therefore the use of multiple accounts should give a broader range of responses and lessen the bias inherent in only using one employer. Although the Company has a significant presence across the world, UK-based managers were sought to enable face-to-face interviews to be performed more readily.

As mentioned, the intention was to interview those with a responsibility for management within a project. This is subtly different from identifying individuals with the job title of 'project manager', for two reasons. Firstly, the role of 'project manager' is not necessarily a clear-cut position. In a large project, potentially employing hundreds of people, there may be numerous people who 'manage'. The purpose of choosing a respondent is for them to answer questions on their attributes, practices and details of the work for which they are responsible. In the case where the PM is not responsible for the whole project, the responses should be bounded by the section of the project for which he or she is responsible. This is appropriate and does not necessarily diminish the validity of the responses, since even an individual responsible for the entire project is constrained by stakeholder influences, client contractual demands, wider organisational issues and so forth. To presume that the project manager acts with complete freedom is inappropriate, and using this perspective, a sub-project manager works under limitations that may be considered similar.

Secondly, the project manager does not have full managerial authority over all project issues, including tasks and actors. A range of managerial roles were designed to be investigated, focusing on the *experience of managing projects*, rather than solely *project managers*. This experience could include *programme managers* (often above the project manager in the organisational hierarchy, the usual career route for whom is to have managed projects previously) and *PMO* (Project Management Office) *managers* (who work closely with PMs and are generally responsible for overseeing the implementation of PM systems) as well as PMs. This broader range of respondents could give a wider perspective on the managerial role.

Participants were to have at least four years of experience managing projects (so that their responses could come from the perspective of having managed projects

for sufficient time to have encountered typical issues and different aspects of the life-cycle, rather than someone new in the position). They were also intended to be relatively 'successful' management representatives of their organisation, and hence their responses could be inferred to represent competence. To use managers judged 'unsuccessful' would not aid in understanding the beneficial practices being sought. A senior programme manager within the Company acted as a liaison to help identify these individuals and assist in organising the interviews.

The key sampling criteria were therefore:

- Multiple roles, to include project managers, programme managers and PMO managers.
- At least 4 years of experience in the management of projects
- At least three different industrial contexts
- Respondents chosen by the Company to be deemed suitable to be interviewed for the study.

It was estimated that approximately 15 interviews of around 60 minutes duration would be adequate to perform an analysis, although there was significant flexibility in this to change the number depending on what was found in the first interviews.

The interview responses were to be recorded, fully transcribed, and analysed using the NVivo8 software application to look for themes (Bazeley, 2007; Miles and Huberman, 1994; Saldaña, 2009). The initial analysis method would be to use template analysis. "The essence of template analysis is that the researcher produces a list of codes ('template') representing themes identified in the textual data" (King, 2004:256). These were initially planned to be the IC elements, with six IC codes (human, social and project capital, each in exploitative and exploratory form), exploitative and exploratory process elements, and the outcome evaluation, in line with the Sub-RQs being addressed.

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

Sub-RQ 1 was developed based on the intellectual capital model, but the rationale generated as part of the literature review was used to argue that *all six* of the elements (human, social and project capital, each in exploitative and exploratory form) could be identified using the manager as the unit of analysis. The role can support both specialist and generalist HC, cooperative and entrepreneurial SC and organic and mechanistic PC. Their operation and, importantly, their interaction, however, were not clear from the literature. An investigation to test this would serve three purposes:

1. This would provide empirical evidence to test the theory that all six elements could be present under complicated organisational conditions.
2. It would also illuminate the interactions of the elements, to better identify how they co-exist in operation.
3. It would additionally show that, and how, the processes of both exploitation and exploration can usefully serve in project delivery (Sub-RQ2). This is implicit in the primary research question, but not validated within the wider literature. It therefore requires empirical testing.

### 3.3.3.1 Initial Protocol Development

Since this work draws upon previous research, as a starting point instruments within the literature were reviewed to re-use aspects as appropriate and provide traceability to previous empirical investigations. From the empirical papers reviewed, full instruments were published in 21 of them (at the time of development), and these were reviewed in detail to determine if any of the questions or approaches were appropriate to incorporate into this interview design. The result is shown in Table 17. Note, however, that where questions were re-used from previous instruments, the terminology was frequently altered to fit the project context, and so for all these references the previous surveys were used as source material to be subsequently modified, rather than used verbatim. Note also that these instruments were used more extensively in the Phase 2 research. The initial questions centred around investigation of the intellectual capital (HC, SC and PC) and exploitative and exploratory processes, based on previous instruments, my experience as a project manager and knowledge of the context of IT services. This was then reviewed with a senior academic, resulting in minor revisions.

Subsequently the questions were reviewed face-to-face with a Project Management Office (PMO) Manager within the IT-services organisation, a Programme Manager, and also with five practitioners in a focus-group style at a different part of the same organisation, to test for clarity and appropriateness in the phrasing. These interviews were recorded and fully transcribed to ensure reliability and traceability, and that all comments were captured. Again, this resulted in minor changes to the text.

**Table 17: Previous Instruments Underpinning the Interview Protocol**

Factor	Themes	Sources
Human Capital	Specialist knowledge, generalist knowledge, experience.	Kang (2006), Ketkar and Sett (2009)
Social Capital [3]	Relationships, networks, communication, trust, shared knowledge.	Jansen et al. (2006), Kang (2006), Tiwana (2008)
Organisational / Project Capital	Rigorous / flexible processes, 'project knowledge', importance of processes.	Im and Rai (2008), Kang (2006), Ketkar and Sett (2009)
Exploitative Learning	Incremental knowledge improvement, lessons-learned, use of processes. Importance to project delivery.	Ci-Rong Li et al. (2008), Im and Rai (2008), Jansen et al. (2006), Kang (2006), Lubatkin et al. (2006), Morgan and Berthon (2008), Nemanich and Vera (2009)
Exploratory Learning	Flexibility, knowledge creation, innovation. Importance to project delivery.	Im and Rai (2008), Kang (2006), Lubatkin et al. (2006), Nemanich and Vera (2009)
Outcome	Assess how well the project is going.	Cegarra-Navarro and Dewhurst (2007), Gibson and Birkinshaw (2004), Ketkar and Sett (2009), Tiwana (2008)



The final protocol is given in Appendix B, although in practice, given the semi-structured nature, the questions were used more as reminders of areas to cover during the discussion than as point-by-point interview questions.

Access was relatively straightforward as the Company was involved in supporting the study and a senior programme manager was acting as a liaison to aid in setting up the meetings. Managers were contacted in a range of different industrial environments (finance, defence, manufacturing, and so forth). Since the discussions were to be based around the role rather than the particular project, the particular phase of the work at the time (beginning, middle, end), was not particularly significant. Although the Company had a significant presence across the world, UK-based managers were sought to enable face-to-face interviews to be performed more conveniently.

A total of sixteen interviews were undertaken, all face-to-face except interview 8 (due to schedule and travel difficulties) which was by telephone. A range of participant roles were utilised with *experience of managing projects*, rather than solely *project managers*. The interviewees included programme managers, PMO managers, an Enterprise Project Office (EPO) manager, a PMO subject-matter expert (SME) with extensive experience in the management of projects, as well as project managers. This broader range of respondents gave a wider perspective on the nature of managing projects.

Individuals were from a virtual PMO covering multiple ongoing UK and European commercial accounts, defence administration systems, one experienced programme manager having worked within numerous accounts, four managers from the banking sector, three from defence product development, and four from a large defence infrastructure IT development consortium. The types of projects included developing multiple industrial IT-systems (including the associated organisational change), bank cheque-clearing systems, public-sector payroll systems, hardware and software new product development, and telecommunications and IT infrastructure development and roll-out. Hence the sampling objective of achieving a broad spectrum of experience was met. The average management experience was well over 10 years, as detailed in Chapter 4, Table 19.

The interviews were intended to explore the management role rather than necessarily the aspects of the particular project(s) they were working on at the time. The data collected were the responses of the managers, and this could refer to the project they were working on, and/or previous experience. The discussions centred more upon the individual manager and their IC and exploitative and exploratory practices, rather than the immediate tasks. This was to give a broader picture, and the intention was not to use the particular project as a detailed case study.

The interviews were semi-structured and broadly followed the protocol of Appendix B. The average duration was around an hour, and all interviews were recorded and fully transcribed for analysis. A practical point was that the intellectual capital questions were relatively straightforward to contextualise and discuss, but exploitation and exploration were difficult concepts to articulate in the language of project management. This issue is explored later, and was a challenge throughout the research. This in itself was a finding from the qualitative nature of the work.

The findings from this research are given in Chapter 4.

### 3.3.4 Phase 2 Research Design

The second stage of the design was to take the findings from Phase 1 and perform multiple case studies to better understand the ‘how’ of ambidexterity and further address the primary research question by answering Sub-RQ3. Case studies have been less prevalent than surveys in the field of operational management (Scudder and Hill, 1998).

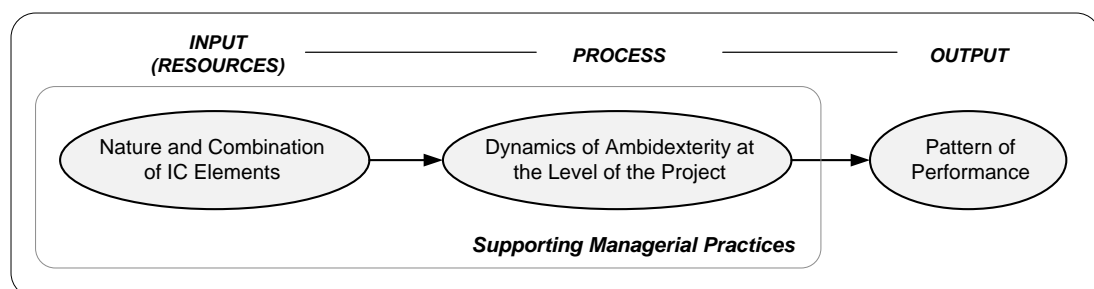
***RQ: ‘How is ambidexterity achieved at the level of the project?’***

***Sub-RQ3: ‘What management practices support the orchestration of ambidexterity?’***

There are a number of important aspects that need to be considered as part of this stage of the research. As discussed in the introduction, the PMI BoK (PMI, 2008:5) defines a project as “a temporary endeavour undertaken to create a unique product, service or result.” The temporality and uniqueness need to be addressed appropriately. Although the initial study focuses on the role and interactions of intellectual capital to give insight into underlying mechanisms, to empirically test the theory developed, it does not necessarily cover the temporal aspects, namely the *when* of the aspects identified. Phase 2 was designed to give a more complete picture of mechanisms over the duration of multiple projects.

Case-bases analyses were planned to illuminate the mechanisms of ambidexterity (Easterby-Smith et al., 2008; Eisenhardt, 1989; Harrison, 2002; Hartley, 2004; Yin, 2009) in Phase 2. Due to the richness of the data that can be obtained, qualitative methods were extended into this phase by examining multiple cases in detail. This is appropriate for answering ‘how’ questions. The reasoning, issues and detailed design will now be described.

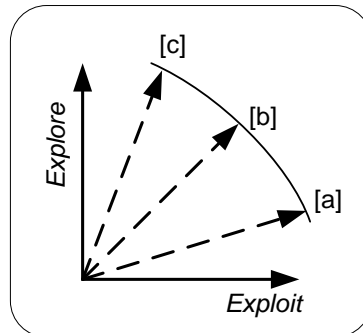
This can be conceived in line with the research model (Figure 39). The managerial influence over project-level exploitation and exploration is evaluated in terms of the outcome by considering the delivery and the *pattern of performance* over the course of the project as a sampling criterion (see section 3.3.4.4).



**Figure 39: Research Model Focusing on ‘Pattern of Performance’**

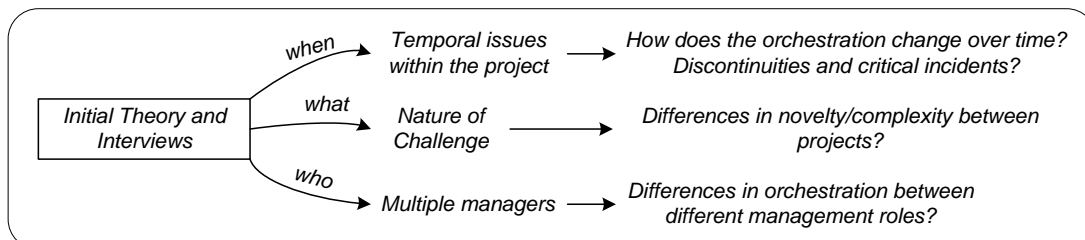
Phase 2 considers the management task of orchestrating ambidexterity at the project level by managing the exploitation and exploration according to the needs of the work. Phase 1 does not specifically address this and the practices that are inherent in it, and because the interviews were not planned within the context of case studies, an incomplete picture was obtained of the interrelationships over time. This was in line with Sub-RQs 1 and 2 that were being addressed. The

'orchestration' of ambidexterity is therefore understood to be the managerial influence over the nature of the exploitative / exploratory achievements at the project level. This is indicated in the simple representation of Figure 40 since depending on the nature of the project requirements at any particular time, the emphasis could be at point [a], [b] or [c], and so forth. These are unlikely to be consistent throughout the whole project, and so the nature of whether projects could be understood in these terms would also form part of the research.



**Figure 40: Project-Level Ambidexterity**

Key issues can therefore be addressed regarding the orchestration of ambidexterity. This section discusses the *when*, *what* and *who* aspects of the investigation. The *when* refers to the temporal aspects that require significant expansion, the *what* is the nature of the managerial responses in terms of challenge (difficulty / novelty / complexity) within the context of a particular project, and the *who* will be the managers of the project (not purely limited to the project manager). These are now discussed in terms of their contribution to the research design.



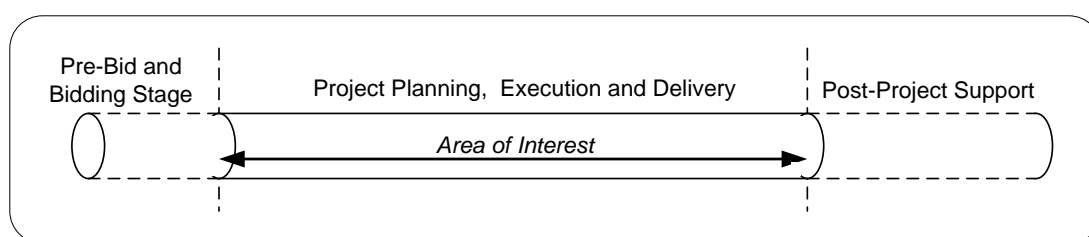
**Figure 41: When, What, and Who?**

### 3.3.4.1 Temporal Analysis

The time-bounded nature of project existence is a key distinguishing factor of the study (e.g. Williams, 2008). Bounding the project by time can, however, be a challenge, as the beginning and end points may not actually be as clear-cut as may be wished. It can be considered from initiation (invitation to tender / bid) through execution and closure (see, for example, PMI, 2008:6). In practical terms, given the context of the research, specific projects under investigation generally take place within accounts (the set of work with a single client) and larger programmes, so this understanding does not necessarily reflect any ongoing activity with the client, relationship-building activities pre-bid or other work before the project delivery activity, or the post-project support and subsequent upgrade cycles. Additionally, within the IT-services Company that is the subject of this study, the team that bids for the work is generally not the same as the one that delivers it, and so there is potentially some disconnect between these elements in this organisation.

Moving the focus to the *managerial orchestration* aids the bounding of the research through a greater emphasis on individual continuity and action. The manager would (generally) be responsible for project execution from the winning of the bid until final delivery completion and this is to be used as the boundary. The part of the project that is of specific interest is therefore shown in Figure 42. As will be discussed, other managerial influences will also be investigated, and it is more likely that the Programme Manager and Project Management Office (PMO) Manager will have greater continuity as these roles generally span multiple projects and a longer time period.

To better understand the progression of projects in the IT context, from discussions with the IT services Company, their management processes over the software and hardware aspects can broadly be classified into three phases. Firstly the Define and Analyse / Discover / Design Application aspect is where the detailed design is constructed. Secondly, the Build Application / Develop / Test Application phase is where the design is realised, and finally the Release System / Implement / Deploy phase is where this is rolled out to the client. These were combined into three segments to allow easier interpretation of the *beginning / middle / end* concepts to provide a common understanding of project progress. However, there is no hard-and-fast delineation of these phases, they are intended to provide only a temporal frame of reference such that common questions can be asked of each period.



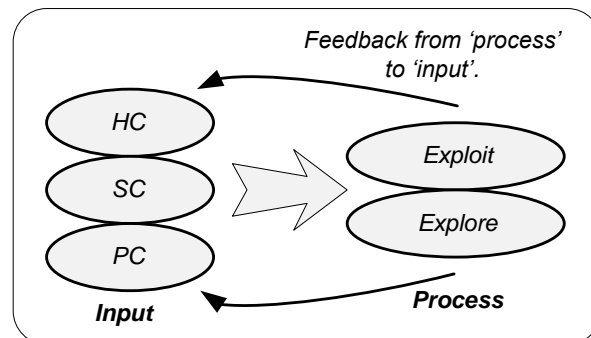
**Figure 42: Project Example**

The time focus of the investigation is therefore the *duration of the project* as indicated in Figure 42, with the role and nature of ambidexterity investigated throughout the work. Turner and Keegan (2004) identify that uncertainty diminishes throughout the project execution process. This is generally to be expected, in that there will always be uncertainty at the beginning of a project, and this must be reduced as the project is delivered. However, this is different from the activities of exploitation and exploration that are undertaken. Given the nature of IT-services, often the post-project support can continue for many years, incorporating significant upgrades which are themselves projects, yet concurrent with ongoing support. The 'simple' view of Figure 42 is therefore an idealisation rather than an accurate representation of the reality of the project environment, and this was considered in the interview process. In practice, as will be discussed at length in the case analysis section, this idealised timeline was insufficient to characterise the projects that were studied. It was used as a guideline for the discussion, but the nature of the environment meant that the operational reality was in fact significantly more complicated.

The focus on managers and managerial practices infers that the project activities in question are those for which he or she has responsibility. This can include the direct management of staff (though not always), but will primarily be the delivery of the project objectives, albeit in this case within the context of the account and/or programme. Therefore the boundary of the project must be considered as that for which the individual is responsible, rather than wider programme or account issues.

Whilst it is accepted that in reality these have inextricable linkages, management practices were intended to be investigated at the level of the project over its duration.

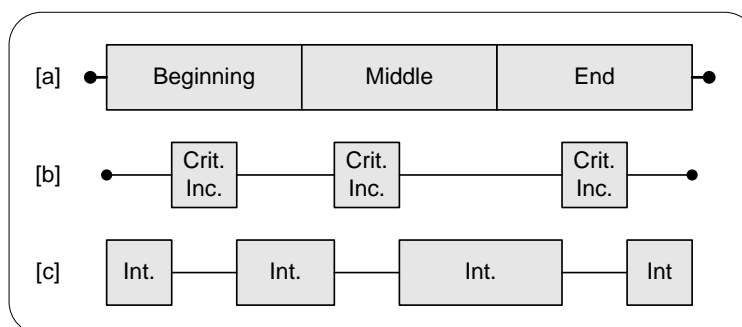
As will be discussed, the use of recently-completed or completing projects as case studies allows all phases of a project to be investigated to gain a sufficiently accurate picture, and can capture the dynamic aspects of how each individual project may change over time. The use of a case study approach allows the 'story' of the project to be the vehicle through which the research question can be addressed. However, in treating the research model in terms of the *input-process-output* approach, a simple linear conceptualisation may be insufficient. As indicated in Figure 43, over the duration of the work the input and process aspects may have feedback and therefore changes to the intellectual capital may be anticipated (i.e. experience adding to HC, social relationships built, processes refined and so forth).



**Figure 43: Feedback into IC Elements**

Projects can also be characterised by change, discontinuities and critical incidents, and so this is also a key aspect of the temporal question. This is indicated in Figure 44. Figure 44a shows the longitudinal aspect as the project progresses, allowing investigation of the methods of orchestration over the duration, yet Figure 44b and Figure 44c highlight how this can be punctuated by critical incidents (for example, a unexpected technical problem, a supplier failure, major change of requirements and so forth). Responding to these is likely to require an alternative managerial response to the 'intervening' periods of (relative) stability. However to conceive as the intervening periods as 'steady-state' or 'business as usual' may infer an unrealistic impression of a static situation.

Together, these aspects should show the reality of orchestration under authentic, practical, conditions. This is suitable for a case study approach, and the critical incident technique is discussed further in section 3.3.4.6.



**Figure 44: Temporal Investigation**

It should be noted that although the CI approach was taken in the research, respondents within the same project did have different interpretations over which incidents were 'critical', and a single view of the 'critical' points versus the 'intervening periods' was not gained. This was a finding in itself, and is discussed along with the case evidence.

### 3.3.4.2 Understanding and Distinguishing Projects and Content

Projects are heterogeneous and can be distinguished in terms of technical and organisational challenge, difficulty, scope, complexity and so forth. There is no 'best way' to categorise the concept of *challenge* in projects, and there is a range of literature that could be applied in attempting to evaluate this.

A way of understanding this can be drawn from the operations literature, that of the *product-process matrix* from Hayes and Wheelwright (1979a; 1979b). This is appropriate, since the project manager is responsible for both the project output (the deliverable 'product') and also the management of the project itself (the 'process'). This conception therefore captures two important aspects of the nature of projects. Based in manufacturing, this concept categorises *products* from low-volume, one-of-a-kind offerings through to high-volume standardised products, and *processes* from jumbled flow (job shops) to continuous flow, and has been widely used (see, for example, the review in Kemppainen et al., 2008). Operations should be organised to broadly match product with process effectively, and these ideas have been refined and tailored over time (e.g. Ahmad and Schroeder, 2002; Ariss and Zhang, 2002; Hill and Menda, 1998; Helkiö and Tenhiälä, 2009). There has been some application to services (for a review see Johansson and Olhager, 2006), including the service product / service product structure model of Johansson and Olhager (2006) developed from the work of Buzacott (2000), Kellogg and Nie (1995) and Johansson and Olhager (2004).

This argument is also reflected in the project management 'goals-and-methods' matrix of Turner and Cochrane (1993). In this, they represent projects as having well-defined methods (yes/no) and well-defined goals (yes/no), leading to a typology. The authors also offer guidance for the management style appropriate for each of the quadrants. This is, though, a limited conceptualisation of the issues that managers have to deal with.

In analysing the citations of the Turner and Cochrane (1993) paper, further evidence becomes apparent. Blomquist and Müller (2006) advise that the leadership behaviours are contingent on the needs of the project, highlighting that the project manager behavioural requirements are dependent on the circumstances. The response to uncertainty is important (see McLain, 2009), and Shenhar (2001a) identifies engineering projects in terms of system scope and technological uncertainty, giving evidence of the characteristics of these options. One finding was that as technological uncertainty rises the technical skill of the project manager becomes more significant, as does flexibility in management style, late design freezes and communication. However, an increase in scope complexity is associated with a more formal and tight bureaucracy to control it.

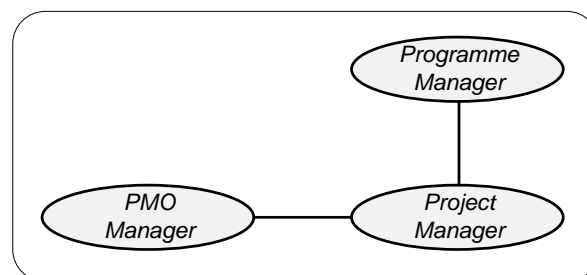
These ideas are also supported by Andersen (2006:19), who argues that "In more technical projects we would assume that the project management model is refined though usage. Organisational learning manifests itself as improvements to processes and procedures". However, for more complicated sets of work, it may be necessary to look beyond processes and rely more on creativity, improvisation and intuition, although "[t]hese factors are contrary to a rigorous model of work"

(2006:19). Control-based approaches can be counterproductive when encountering uncertainty, since planning is done with incomplete knowledge. These add to our understanding of the application of ambidexterity.

In searching for a categorisation method, Crawford et al. (2006a) and Crawford and Pollack (2007) find that project organisations use multiple attributes to categorise their projects. For analysis and sampling, there is neither a consistent approach used in practice, nor within the literature. However, the use of a broader approach offers the opportunity to identify, understand and sample projects in terms of their *complexity*. The complexity approach was discussed in the literature review, focusing on the review by Geraldi et al. (2011b), and this is incorporated into the sampling design described in section 3.3.4.8.

### 3.3.4.3 Managerial Perspectives

To better understand the orchestration of the project, triangulation can be employed from multiple managerial viewpoints. As well as the Project Manager, the Programme Manager and Project Management Office (PMO) manager (if applicable) can be interviewed, to gain a wider managerial perspective. This is indicated in the simplified diagram of Figure 45. The Project Manager is most likely to have the greatest knowledge of day-to-day operations, but the Programme Manager and PMO Manager are likely to have a wider view of the project context, so knowledge of their influence is also valuable. Their different perspectives of the orchestration of ambidexterity offers a valuable research opportunity, since, as highlighted in the literature review, the managerial role is an important aspect of the field, yet multi-respondent cases are lacking.



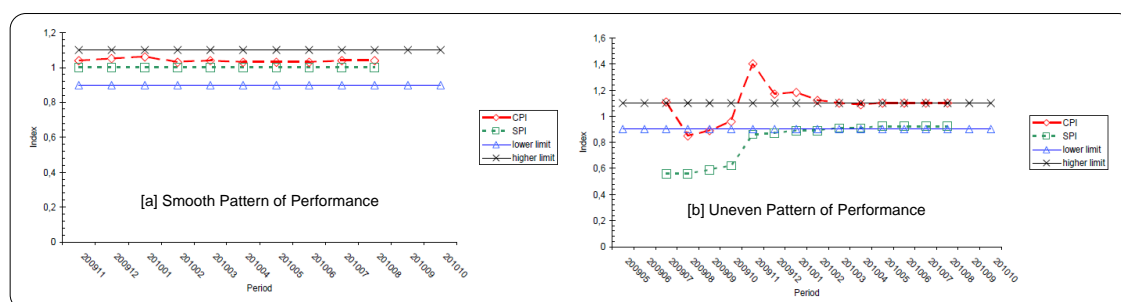
**Figure 45: Managerial Responses**

Alternative managerial perspectives from roles such as ‘team leader’ or delivery manager’ are also available to be incorporated, depending upon the nature of the project and access. With reference to the experience of the researcher in qualitative research (section 3.2.2), Jick (1979:608) advises: “While one can rely on certain scientific conventions (e.g., scaling, control groups, etc.) for maximizing the credibility of one's findings, the researcher using triangulation is likely to rely still more on a ‘feel’ of the situation. This intuition and firsthand knowledge drawn from the multiple vantage points is centrally reflected in the interpretation process. Glaser and Strauss’ (1965:8) observation about fieldworkers summarizes this point of how triangulated investigations seem to be crystallized: ‘The fieldworker knows that he knows, not only because he's been there in the field and because of his careful verifications of hypotheses, but because “in his bones” he feels the worth of his final analysis’.” This is important in accepting the role of practical judgement in the case design.

### 3.3.4.4 Outcome – Delivery Evaluation

From the *input-process-output* model, it is important to evaluate the effectiveness of the orchestration of ambidexterity. As discussed at length, a simple and widely-agreed outcome evaluation is not readily achievable, yet there is sufficient Company data to enable the performance data to be used as an effective mechanism for case sampling.

Referring back to Figure 39, the output term is understood here as the *pattern of performance*. Orchestration can be considered an active process, and evaluation can be performed as an ongoing activity, rather than at the end of the project. Here the pattern of performance is to be understood as the conformance to the plan, as measured via the concept of *earned value* (for example, Maylor, 2010). Here actual project spend and schedule performance can be evaluated against the planned work. Real Company examples are given in Figure 46, showing ‘smooth’ performance (cost and schedule within allowed bounds) and also ‘uneven’ performance where both are deviating from expectations (although recover in the second half of the project). SPI represents ‘schedule performance index’ and CPI is ‘cost performance index’.



**Figure 46: Patterns of Performance**

Use of this data allows comparison of projects regarding their pattern of performance. This method is based upon regularly-collected, (reasonably) objective data, and therefore allows the identification of smoothly-performing projects against those where variances have been encountered. For the purposes of investigating orchestration, this is valuable information.

With the use of the manager as the unit of analysis, there is a risk that the respondent will wish to show his or her management of the project in a good light. The *output* within the I-P-O model (in this case, the pattern of performance) is important, and therefore it is to be evaluated by this external measurement, beyond that of the project manager. It is accepted that the manager is likely to be the source of the project data from which these patterns are generated, yet it is based on verifiable spending and delivery data. This is important in ensuring a more robust research plan.

Podsakoff and Organ (1986) argue that using a self-report of characteristics such as personality or behaviour, together with an evaluation of another variable (in this case, project outcome) introduces the problem of *common method variance* (Campbell and Fiske, 1959; Fiske, 1982). This is significant research problem, including the field of IS (Burton-Jones, 2009; Sharma et al., 2009). A practical method of overcoming this is the separation of measurements, and in this case using alternative, external, sources of data for the output measurement ensures no (or very limited) correlation between this and the respondents. Comparison of Company data and participants responses allows an element of triangulation,



broadly defined the combination of methodologies in the study of the same phenomenon (Jick, 1979:602).

Podsakoff et al. (2003) review and explore the subject in detail. The common-rater effects that may play a part in this research are:

- The 'consistency motif' whereby respondents try and produce relationships, inferences and consistency between data that may not exist in real life.
- The 'implicit theories' that the respondents may believe regarding co-variation between actions and outcomes.
- The 'social desirability' and 'leniency biases' of responses, potentially leading to a lower willingness to rate poorly a project they were responsible for.
- The effect of 'mood-state' on responses means that responses regarding the history of a project may be altered by the current events.

Podsakoff et al. (2003) recommend separating the sources of data for the predictor and criteria variables where possible, and in this case, given the difficulty with the 'outcome' measure, it is feasible to consider an externally validated measurement. To accomplish this, I obtained extensive data from the Company on their projects, including assessments throughout their execution, supported by numerical data on cost and schedule performance. This is more objective (although still subject to error) than the subjective view of the project manager. This is discussed in more detail, shortly.

### **3.3.4.5 Case Sampling Plan**

The case methodology and sampling is now discussed further, based on Yin (2009). The use of a case study is appropriate for a 'how' research question (Yin, 2009:8), and "copes with the technically distinctive situation in which there will be many more variables of interest than data points", and "benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin, 2009:18).

Note that of the six sources of evidence recommended by Yin (2009:101) (documentation, archival records, interviews, direct observations, participant observation and physical artefacts), interviews, records and documentation were the intended sources of information.

Yin (2009:40) argues that four quality tests should be applied to case design: construct validity; internal validity; external validity; and reliability. In this design:

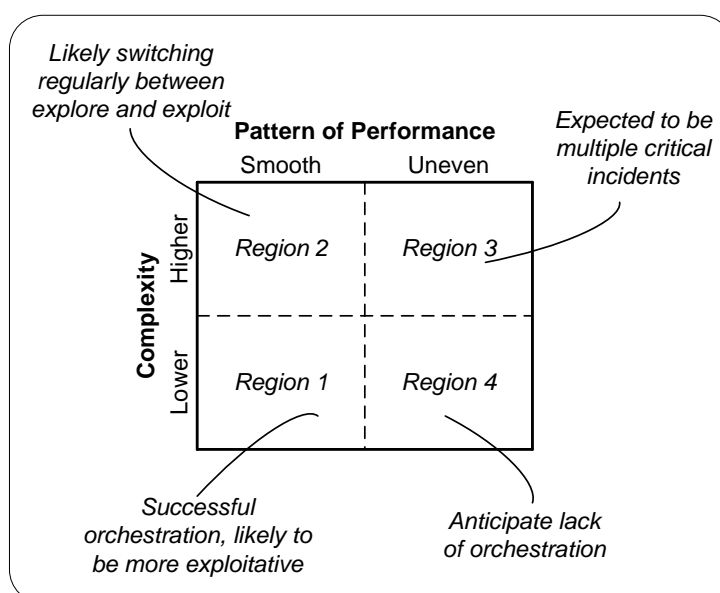
- Construct validity - increased through multiple sources of evidence (multiple interviews and historical project data) and the development of a chain of evidence (key documents, interviews and transcripts and documented analysis).
- Internal validity - enhanced by cross-case pattern-matching (Yin, 2009:43) based on the protocol developed.
- External validity - enhanced by replication of the protocol across multiple cases.
- Reliability - improved by the use of a case study protocol together with a case study database.

In their survey, Bryman et al, (2008) find that qualitative validity is most important, whilst reliability, replicability and generalisability are of lower emphasis when compared to quantitative methods (based on Lincoln and Guba, 1985). Johnson et al. (2006:138-9) emphasise the need to provide an audit trail, yet rigour and

traceability must be coupled with openness, flexibility and reflexivity to follow emergent themes (Cassell et al., 2009; Easterby-Smith et al., 2008a).

The case studies were based on a multi-case replication design (Yin, 2009:53). In looking at complete (or nearly-complete) projects, in order that recollection of the early phases can be achieved, the projects chosen were intended to be relatively short in duration (<18 months). The managers should ideally have been in place for the duration of the project, so that he or she could answer for each aspect. The individual should also have been responsible for the activities understood as 'the project', i.e. the project manager heads up the delivery of the project and the work is taken to be that which is under his or her control.

The purpose of sampling multiple projects is to gain a greater in-depth understanding of the orchestration of ambidexterity and enable the research question to be answered under a variety of circumstances. The dimensions of interest in terms of sampling are the level of complexity and the pattern of performance over time. This is indicated in Figure 47, where four different regions offer dissimilar examples through which to address the research question. Note that the details of the complexity assessment and the analysis of the pattern of performance are given shortly.



**Figure 47: Sampling Options**

The pattern of performance can be understood as the implementation of the exploitative and/or exploratory orientation at the project level such that the project delivery objectives are met (referring back to Figure 40), and this can be assessed throughout the project (via, for example, earned value tracking, as in Figure 46) and is not solely dependent upon the final outcome. It is not reliant upon subjective managerial judgement but can be based on more objective performance data.

In Region 1 of Figure 47, a lower-complexity project with a smooth pattern of performance (i.e. consistent, with few deviations from expectations) is most likely to indicate a more successfully-executed piece of work with a tendency towards exploitation. Note that this would not necessarily be the case, there may have been significant unexpected issues that have been overcome, but the lower complexity (assessed via Company evaluation) would make this less likely. In Region 2, a smooth pattern of performance is likely to indicate successful balancing and/or

switching between exploitative and exploratory modes under more challenging circumstances. There are more likely to have been significant issues to overcome, yet the continuity indicates that these have been accommodated with minimal deviation from the expected plan.

Region 3 in Figure 47 is where there is an uneven pattern of performance under conditions of higher complexity, likely to be due to a number of critical incidents and a source of rich data as to managerial practices under these circumstances (for example, Figure 46b). Deviations and (potential) recoveries provide a different narrative as to the nature of the orchestration under these circumstances. Deviations are not necessarily 'right' or 'wrong', since an unexpected event may be outside of managerial control and recovered well, yet these provide more variety to better research the 'how' question under these conditions. Finally, uneven patterns of performance under conditions of lower complexity (Region 4) may indicate unsuccessful orchestration. This is not a certain interpretation, and this quadrant offers an alternative perspective to those of the other three.

All Company projects have 'traffic-light' (red, amber, green) evaluations both during the project and at the end to evaluate them against their objectives with which to also evaluate 'success'.

In summary, the quadrants of Figure 47 give appropriate theoretical sampling scenarios through which to better understand orchestration. Note that in operation it is difficult to draw a firm distinction between the quadrants, hence the dotted-line delineation. However, it is a choice that can be used as a practical sampling plan since it utilises dimensions for which data is available on a significant number (many hundreds) of projects. Therefore sampling via these aspects is achievable via accessible Company data, as will be discussed in detail. It was initially estimated that two cases per quadrant would be used, to give a total of eight. A replication strategy was intended covering both similar and dissimilar cases so that these can be juxtaposed. This is in line with Eisenhardt (1989).

### 3.3.4.6 Protocol and Analysis

As highlighted, the protocol was intended to be designed to examine the orchestration of ambidexterity over the duration of the project, with three areas to investigate: the changes over the course of the project, the transitions at times identified as critical incidents, and the operation during the intervening periods.

The interview protocol would be used to look at the intellectual capital inputs and process aspects of each case (with the manager as the unit of analysis). In aiming to look at the beginning, middle and end phases of the project. These were intended as common discussion areas for the interview although, as with Figure 42, this was likely to be an oversimplification of reality (as indeed was found to be the case). The time period discussion would be supported by descriptions of critical incidents (as shown back in Figure 44).

For this, the *critical incident technique* would be used (Chell, 2004; Easterby-Smith et al., 2008:150-1; Saunders et al., 2007:325), based on Flanagan (1954). Flanagan (1954:327) describes an incident as "any specifiable human activity that sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical the incident must occur in a situation where the intent or purpose of the act seems fairly clear to the observer and where its consequences are sufficiently definite to leave little doubt concerning its effects." To look at such events from the perspective of the manager and his or her actions

allows a greater understanding of the orchestration techniques employed. This is in line with Chell (2004:48), who described it thus: “The critical interview technique is a qualitative interview procedure, which facilitates the investigation of significant occurrences (events, incidents, processes or issues), identified by the respondent, the way they are managed and the outcomes in terms of perceived effects. The objective is to gain an understanding of the incident from the perspective of the individual, taking into account cognitive, affective and behavioural elements.” As Chell (2004:47) argues “accounts are always retrospective; however, the fact that incidents are ‘critical’ means that subjects usually have good recall.” This is at odds with Flanagan (1954:331) where he cites a study showing that foremen who report incidents only every two weeks appear to have forgotten 80% of the incidents compared to those who reported daily. However, he argues that “critical incidents obtained from interviews can be relied upon to provide a relatively accurate account of job performance if suitable precautions are taken to prevent systematic bias.” (Flanagan, 1954:331).

In terms of use, Flanagan (1954:335) writes: “It should be emphasized that the critical incident technique does not consist of a single rigid set of rules governing such data collection. Rather it should be thought of as a flexible set of principles which must be modified and adapted to meet the specific situation at hand.” He advises five steps to the technique:

1. Determination of the general aim of the activity (in this work, the understanding of the orchestration of ambidexterity)
2. Development of plans and specifications for collecting factual incidents regarding the activity.
3. Collection of the data
4. Analysis of the data.
5. Interpretation and reporting.

### **3.3.4.7 Case Study Plan Detail**

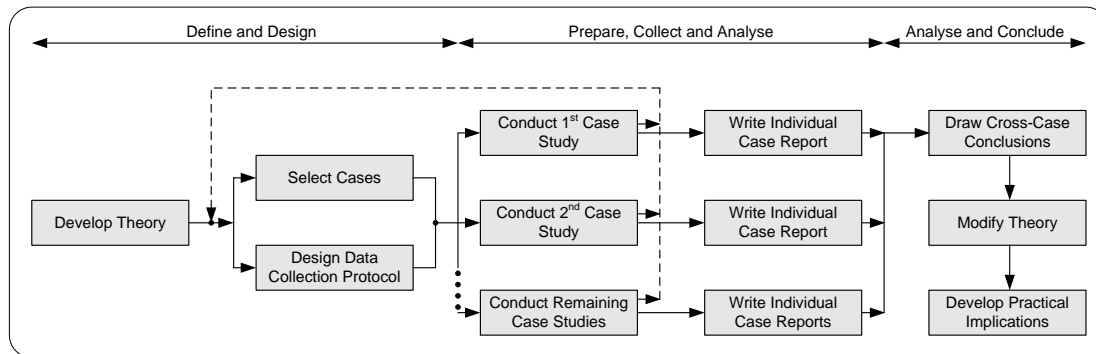
The first case study (Yin, 2009:92) was chosen to be a lower-complexity project with a ‘smooth’ pattern of performance since this was likely to be the most straightforward type to investigate. Yin’s (2009:114) three principles of data collection were followed:

- Multiple sources of evidence (interviews and project documentation) to aid construct validity.
- Construction of a case study database, to enhance reliability.
- A chain of evidence maintained.

The analytic strategy would rely upon the theoretical propositions to guide the analysis. Yin (2009:130) describes this as “the most preferred strategy”. Of the five analytic techniques described by Yin (2009:136) (pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis), pattern-matching and cross-case synthesis were to be used. Pattern-matching involves comparison to the protocol developed, although this can be considered imprecise. As Yin (2009:140) argues, “[a]t this point in the state of the art, the actual pattern-matching procedure involves no precise comparisons.” Given the multiple cases to be analysed, comparison of cases was expected to be significant in theory-building and testing, and this was indeed the case.

The sampling strategy and research plan was planned to proceed as shown in Figure 48 (based on Yin, 2009:57). This is an iterative strategy, with potential

feedback as information is obtained from cases. Flexibility to modify the approach was retained to accommodate findings from the case analyses, but in practice a common protocol was used for each interview and alterations were not required.



**Figure 48: Case Research Plan based on Yin (2009:57)**

### 3.3.4.8 Sampling via Company Data

To provide purposive sampling (Easterby-Smith et al., 2008:218), a Company database of recent and current projects was used. This includes multiple industrial accounts (finance, telecoms, government services, etc.), within the IT services company that is the subject of the study, covering the UK and EMEA. Hence a selection of cases was to be taken from the broader population (Eisenhardt, 1989). Although only a single company was used, the range of industries was chosen to be as broad as possible.

The sampling criteria were taken to be UK-based projects, for ease of access. Recently-completed or currently-completing projects were targeted, with an intended maximum duration of 18 months to allow recollection of the duration of the work. To eliminate overly-short projects, a minimum duration of 9 months was selected. A breakdown of how the sample size was reduced is given below (data from the November 2010 database).

*Total sample size: (682)*  
     *→ UK-based: (207)*  
         *→ Start Mar 2009-May 2010; Forecast finish Sept. 2010 - June 2011 (52)*

These projects were analysed with a view to sampling in line with the strategy outlined in Chapter 3, namely assessing along the dimensions of ‘complexity’ (Gerald et al., 2011b) and the pattern of performance.

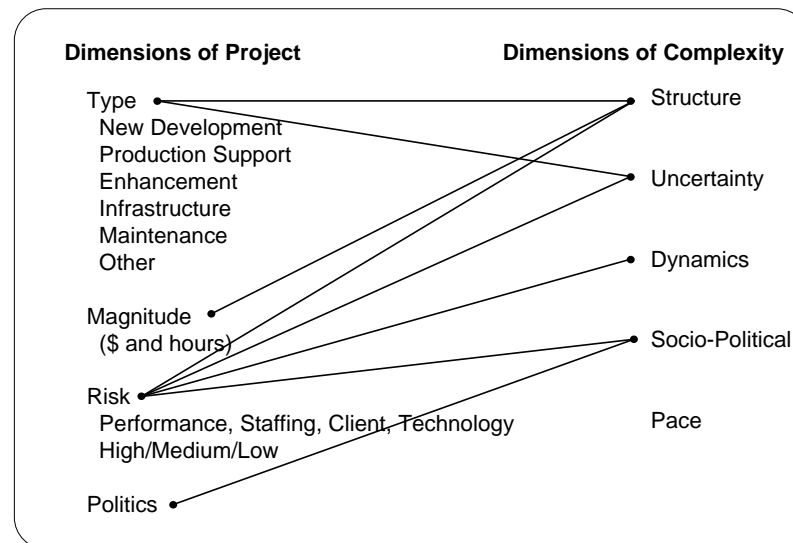
The ‘complexity’ assessment was performed using the performance data from the Company database. I reviewed additional Company documentation in which these factors are defined such that a detailed assessment and categorisation of these factors is possible. There is limited scope for ambiguity or interpretation in the assignment of ratings. Note that some of the ongoing support activities are classified and managed as ongoing ‘projects’.

Key assessment criteria from the project database include the following:

- Profile Type: *New Development / Production Support / Enhancement / Infrastructure / Maintenance / Other*
- Magnitude: *Very Large / Large / Medium / Small / Very Small; Staff hours, Contract value (\$)*

- Risk (Performance, Staffing, Client, Technology): *High / Medium / Low*
- Politics: severity of issues
- Industry Sector
- Status (Performance, Staffing, Client): *Red / Amber / Green* [note: this is a snapshot at a single point in time].
- Earned Value Status: financial (snapshot) information
- Staffing (actual versus planned)

This data could be used to (broadly) assess the project complexity against the dimensions of Geraldi et al. (2011b), and this mapping is shown in Figure 49. Clearly this is not a direct comparison, but it allows sampling to be based on an established framework within the literature using Company data.



**Figure 49: Assessing Project Complexity**

For the initial sampling, the database was used to choose projects with different levels of complexity. This was to provide a comparison between higher and lower complexity projects, to assess whether this affects ambidexterity. In the absence of a definitive classification, projects ranked as 'high risk' or 'large' / 'very large' were ranked as higher complexity, those with 'low' or 'medium' risk and below 'large' in magnitude were deemed to be lower complexity. As will be demonstrated, perceptions of complexity varied amongst participants, and so a definitive taxonomy is impractical. The distinction was intended only as a variable to enable case sampling.

Sampling via smooth or uneven patterns of performance was more difficult, since the project performance (mainly financial) data available was only a snapshot at the time the database was sampled. Given that the projects under investigation were at the latter end of their execution, early deviations from plan that were recovered would not necessarily be reflected in the current data. To overcome this, historical project data was requested for each project of interest. Each had approximately fifteen pages of numerical, textual and graphical data showing the monthly history of the status, budget, issues, earned value data, financial margin, cost management, changes, staff profile, and key commitments. I reviewed these to assess adherence to the original plan over the duration of the project.

Assessment of adherence to the anticipated performance could therefore be achieved, although again, as will be shown, the metrics recorded (although

relatively detailed), did not give the full picture of the project that was obtained through qualitative interviewing. Issues and critical incidents were uncovered in the cases that were not reflected in the 'headline' financial performance and schedule data. When trying to understand ambidexterity, an ostensibly smooth pattern of performance can hide the mechanisms that led to the performance being achieved, and so looking in more depth proved to be far more illuminating than the raw project data showed.

From analysis of these reports, the performances of the projects were evaluated as 'green' (Cost Performance Index – CPI / Schedule Performance Index - SPI deviation within limits, no significant issue), 'amber' (slight deviation from acceptable limits, no significant impact, 'orange' (considerable deviation from initial expectations) and 'red' (major deviation from plan / project out of control). Note that these although these assessments were data-driven, the considerable range of data available makes a simple categorisation challenging, and so a certain amount of subjectivity is inherent in the evaluation. However, this was to generate the list of projects as part of the sampling exercise.

As was subsequently discovered (not unexpectedly), the reality of the projects and the perceptions of the managers was not always in accordance with an assessment of the work in terms of the reports. As will be discussed, primacy in the analysis was given to the interview evidence as it was significantly richer in terms of describing the reality of the project work. A summary of the projects in terms of the available data is shown in Table 18. Some of the data supporting the 'performance' assessment is given in the case descriptions in Appendix D. The relative complexity and performance of each project is indicated in the sampling matrix of Figure 50, below, which shows the logic of the sampling choice.

**Table 18: Case Selection Data:**

Case	Type	\$ Total	\$ Labour	Perf.*	Risk	Mag.
1	Production	921,224	917,516	Green	Low	Medium
2	Production	5,081,010	5,081,010	Amber	Med.	Large
3	New	142,956	142,956	Orange	High	Small
4	Production	753,585	753,585	Green	High	Medium
5	Enhancement	119,054	119,054	Amber	Med.	Small
6	Enhancement	1,330,188	1,021,462	Orange	High	Medium
7	Production	1,727,402	1,727,402	Green	High	Medium
8	Enhancement	3,237,617	2,486,528	Orange /Red	(High)	Large

\* = my initial assessment of the project performance using Company data.

Case 8 (in the defence industry) was chosen for two reasons. Firstly, in order to gain exposure to the defence sector in the study (not covered in the previous seven). Secondly, the bulk of the analysis was performed on the previous cases, and this was chosen to assess whether conceptual saturation had been reached, and this was tested in a new context. Note that the Case 8 performance data was not available from the same source as the other seven. Instead, as part of the case, Company gate review data totalling 78 pages was used as additional evidence. For this reason the risk assessment in Table 18 is bracketed as it is my assessment and not the Company's.

None of the case projects was highlighted as 'red' in the data, and this is down to a number of reasons:

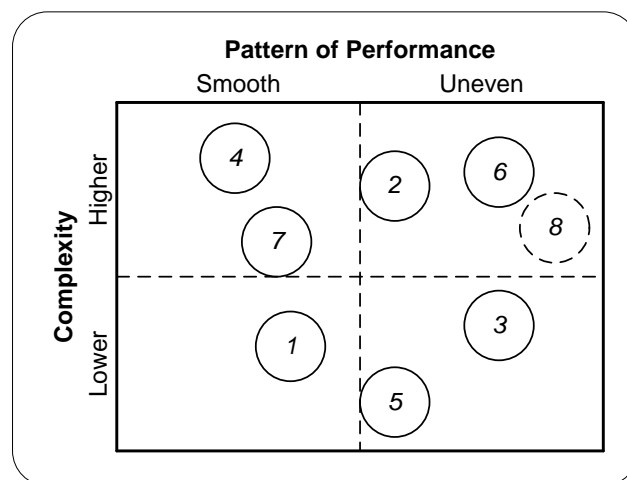
- 1) The status shown is a snapshot in time and is not necessarily representative of the history of the work. A 'red' status leads to intense pressure to resolve the underlying issues and therefore may only be a transient state and potentially last just a few days.
- 2) There were very few 'red' projects in the data. Attempts to contact several project managers whose projects were in this state were unsuccessful or did not result in a case study due to the project being terminated and the team disbanding.
- 3) There is a strong incentive not to appear 'red' due to ongoing downsizing within the Company. Several managers discussed (outside of the formal case interview) the importance of maintaining progress and staying 'off the radar' under these circumstances. Nobody wanted to appear red at any point in the project, and so only a small percentage being identified as such on the database is understandable.

The problem is captured in a quote from interview 13 in the first phase of research:

*“And the main man will stand there and he will haul his programme managers in and say ‘You’re in the red! Why are you red? Tell me!’”*

In practice, the critical incident technique provided evidence of significant issues that occurred, and some projects experienced (or were just about to be flagged as) red status. Note that these could occur on a timescale shorter than the (monthly) reporting period and would therefore not necessarily appear on, or influence, the report.

In reality, therefore, several projects were indeed 'red' at some point during their execution, but this was only identified via the qualitative interview process rather than through the formal data.



**Figure 50: Initial Project Classification and Sampling**

The sampling was also chosen based on cases where the managers / offices were available within a day's travel (i.e. a face-to-face meeting possible without overnight accommodation). The intention was to meet at least the primary project manager on each case, although in practice for some of the distributed teams some of the other interviewees had to be contacted by telephone because of distance issues (a total of 5 interviews were by telephone, full interview details are given in Appendix D). Although the original plan called for a programme manager, project manager and PMO manager, in practice a range of management roles were used, depending on



the configuration of the project (including service delivery manager, technical manager, team leader). Each case had between three and five management respondents, to provide a richer range of roles and viewpoints.

Further details of the interview protocol used are given in Chapter 5 since the protocol built upon the Phase 1 findings and could not be fully developed in isolation from the first stage of the study.

Details of the results of this research are given in Chapter 5, with supporting data in Appendix D, including project financial performance metrics.

## 4. CHAPTER 4 - PHASE 1 RESEARCH FINDINGS

This chapter describes the Phase 1 research findings. A summary of the findings is given, followed by the detail of the coding and the subsequent analysis.

### 4.1 Research Detail

This section summarises the nature of the interviews, and the initial coding results. The chapter addresses Sub-RQs 1 and 2, as part of the overall RQ:

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

***RQ: 'How is ambidexterity achieved at the level of the project?'***

#### 4.1.1 Participants in the Qualitative Interviews

As discussed in Chapter 3, interviews were undertaken within the same large IT-services Company. Details of the respondents are given in Table 19.

**Table 19: Source of Interviews**

Interview	Position	Exp. (years)	Client Organisation	Date	Time
1	PMO Manager	10	Virtual PMO (Commercial)	Dec '09	47m
2	PMO Manager	12	Defence Admin. PMO	Jan '10	87m
3	Programme Mgr.	15	Internal to Company	Feb '10	82m
4	Project Manager	5	Banking	Feb '10	48m
5	Project Manager	14	Banking	Feb '10	48m
6	Project Manager	7	Banking	Feb '10	36m
7	Project Manager	10	Banking	Feb '10	44m
8	Bid Team Proj. Mgr.	5	Government Department	Mar '10	49m
9,10	PM, PMO SME	14, 20	Defence Systems	Apr '10	42m
11	Project Manager	18	Defence Systems	Apr '10	61m
12	Project Manager	~20	Defence Systems	Apr '10	31m
13	Project Manager	20+	Defence Infrastructure	Apr '10	89m
14	Programme Mgr.	20+	Defence Infrastructure	Apr '10	78m
15	Project Manager	8	Defence Infrastructure	Apr '10	52m
16	EPO Manager	20+	Defence Infrastructure	Apr '10	25m

#### 4.1.2 Analysis Method

The initial analysis method was to use template analysis. "The essence of template analysis is that the researcher produces a list of codes ('template') representing themes identified in the textual data" (King, 2004:256). Analysis of the interview transcripts was performed using the Nvivo 8 software package (Bazeley, 2007). The a priori coding framework was utilised based on the research model and the

interview protocol, looking at *inputs* (HC, SC and PC, each with exploitative and exploratory modes), *process* (exploitation and exploration) and *outputs* (delivery and evaluation). This is initial ‘structural coding’ (Saldaña, 2009:66-7).

The coding analysis began with a hierarchical approach (King, 2004) using the top-level codes from the research model (Saldaña, 2009:3). Through analysis of the transcripts, lower-level codes were added to accommodate specific findings (Easterby-Smith et al., 2008; Miles and Huberman, 1994; Saldaña, 2009) as they emerged from the data, but this was found to be too detailed, including project-specific aspects that were not replicated across different projects and therefore were not deemed particularly useful. Consequently these minor-sub-codes were mostly eliminated and the initial codes were found to be the most valuable. The only two remaining sub-codes were those for ‘change control’ and ‘lessons-learned’, which were regularly mentioned as part of exploitative project capital. The overall coding structure is given in Table 20, from which it can be observed that there are a great many examples under each code. This analysis technique is what Saldaña (2009:19) calls ‘lumper’ coding, as opposed to the ‘splitter’ technique, whereby the data is split into “smaller codable moments.” Whilst the number of instances of a code occurring is not necessarily taken as a measure of significance, the large number of instances of the main codes in Table 20 should not be taken as a large number of separate concepts.

It was apparent after only a few interviews that the respondents were readily able to give examples of both exploitative and exploratory HC, SC and PC, and this evidence came through strongly, thereby supporting the theory developed earlier (discussed in detail, shortly). More difficult were the instances of exploitation and exploration and, although the principles could be explained to the interviewee, attempting to ‘bound’ these concepts with examples and practices was challenging.

After around 10 interviews, saturation was detected, which Partington (2002b:151-2) argues is when “no new categories or properties are found, and all further instances of data merely add to the bulk of specific instances of already-discovered categories and properties.” Eisenhardt (1989:545) describes it as when “researchers are observing phenomena seen before.” See also Corbin and Strauss (2008:143), and Saldaña (2009:161-2). However, subsequent interviews added examples from different industrial areas. As will be demonstrated, saturation was ‘only’ detected in terms of the data that was being sought, that of examples of intellectual capital, together with exploitation and exploration. From this perspective the later interviews did not appear to offer any new insight, however, the extra data subsequently proved especially useful in later analysis as more insight was gleaned than had been anticipated.

**Table 20: Initial Coding Structure**

<b>Code</b>	<b>Sources</b>	<b>References</b>
Ambidexterity Examples	6	9
Balance of IC	11	12
Human Capital - Exploitative	15	97
Human Capital - Exploratory	14	58
Social Capital - Exploitative	14	121
Social Capital - Exploratory	14	79
Project Capital - Exploitative	15	186
Project Capital - Exploratory	15	70

Process - Exploitation	15	115
Change Control	5	11
Lessons-Learned	4	6
Process - Exploration	15	70
Output	12	21
	<b>TOTAL</b>	<b>876</b>

The initial coding data in Table 20 appears sparse with large clusters of data under each heading. In terms of method, the analysis of these broad codes was subsequently performed in Word, with further categorisation based on literature themes performed in a document format rather than in Nvivo, for ease of manipulation of the text.

From this, the first stage of analysis was to identify the nature of the IC elements and their exploitative and exploratory forms, and the processes of exploitation and exploration that could be recognised. This was stage 1 of the coding (and described in the next section). However, it soon became clear that a far richer picture could be obtained regarding the operationalisation of ambidexterity than had been anticipated at the outset. The initial analysis and coding was based on the ideas within the research model, and the understanding that emerged from the data supported the initial theory and the purpose of the interviews. However, in performing the coding, further understanding surfaced, and it was apparent that more benefit could be derived from the data. Specifically, many of the examples from the interviewees actually fitted multiple codes, which gave far more scope for analysis. In aiming to code for the primary essence of the transcribed text, I had difficulty disentangling the constructs. Attempting to use an emergent hierarchical coding structure was not satisfactory in this regard and so a second round of coding analysis was performed with the purpose of *parallel-coding* (King, 2004) – also known as *simultaneous coding* (Saldaña, 2009) - to highlight the interaction between the coding elements. This is explained more fully in section 4.6 to show the insight gained by this method.

The analysis therefore consisted of two separate stages:

- Stage 1 – identification and analysis of the elements within the research model.
- Stage 2 – analysis of the interaction between the elements for a greater understanding of the micro-mechanisms of ambidexterity.

More was obtained from the data than was initially anticipated, and this is in line with Cassell et al. (2009:516) who discuss “the demands upon the qualitative researcher to create a flexible, responsive research design that may be unpredictable, emergent and contingently varied according to the nature of the social context(s) being investigated.” Trial analysis subsequently showed that a deeper understanding of ambidexterity and its mechanisms could be gained from the transcripts.

This analysis was powerful in addressing the Sub-RQs that were the purpose of the investigation:

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

The findings from the interviews and subsequent interpretation are now given.

#### **4.2 Summary of Initial Findings**

The purpose of the work was to begin to investigate the research question of how project manager intellectual capital may enable ambidextrous project learning. The first stage was to understand the nature of PM IC and whether ambidexterity could in fact be determined.

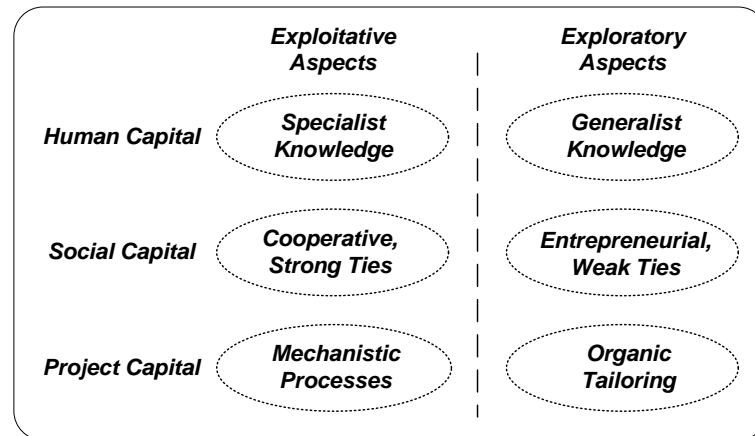
Several key findings were identified from analysis of these interviews:

- Firstly, the evidence supports the idea that project managers use exploitative and exploratory intellectual capital at the HC, SC and PC levels. This indicates that all six elements within the intellectual capital model are utilised.
- Exploitation and exploration, although theoretically well-conceived as separate (March, 1991) are difficult to disentangle from the qualitative responses. End-points of the constructs are readily identifiable, but definitional and conceptual ambiguity exists when trying to classify the descriptions of the activities generated from qualitative research.
- Analysis of the responses highlighted that to conceive of the intellectual capital elements or exploitation / exploration processes in isolation is an insufficient theorisation. As will be discussed in detail, categorisation of responses using multiple codes indicates that there is inter-linkage of the input and process constructs, and multiple operational permutations.

In the following sections, examples are given of the HC, SC and PC to further develop the concepts, together with exploration and exploitation. This is subsequently expanded to show the inter-linkages between these elements.

#### **4.3 Findings – Intellectual Capital Configuration**

The interview protocol was designed to establish whether the project managers use both the exploitative and exploratory resources of HC, SC and PC. The following discussion uses the summary model of Figure 51 to investigate the six distinct elements.



**Figure 51: Structure of Findings**

#### 4.3.1 Human Capital

Kang and Snell (2009) argue that HC can be split into specialist and generalist aspects. “Specialists typically have knowledge that is deeper, localized, embedded, and invested within particular knowledge domains. Generalists, on the other hand, tend to be multi-skilled with a more versatile repertoire of capabilities that can be used across alternative situations.” (2009:68).

The respondents’ opinions indicated that the managerial role did in fact embody both facets. In this context, specialist knowledge can be understood as project management knowledge (skills, training, qualifications, knowledge of relevant tools, procedures and techniques), technical domain knowledge (e.g. from previous experience as a software coder) and/or client domain knowledge (e.g. a strong understanding of the client requirements). Generalist knowledge can be understood as previous experience that can be drawn upon in different circumstances, and an understanding of the project within the wider context of business strategy and operations, both within the Company and the client.

*“Because it’s quite a wide range of areas that I cover, I would say that there are areas I have a lot of experience in specifically, so in those areas I tick the specialist box, but because of the wide scope of things I’m expected to cover, I am certainly not a specialist in a lot of them. So I couldn’t pigeon-hole myself in either to be honest. A generalist with a specialism in certain areas.”*

*“I would say as a project manager, it’s important to have a good understanding of what’s going on. Now the more knowledge you have in a particular field, it’s going to allow you to have more in-depth knowledge in a certain area into the details. So for example, if you’ve got a Unix person working for you and I know virtually nothing about Unix, you’ve got to go on trust on what they say so a good overview is what you need, essential.”*

There is no optimum solution, though, and the project manager’s knowledge and approach should be adapted to the type of project:

*“It depends on the type of project, really. To give an example, I tend to find that work-stream leaders tend to be the specialists, and the project manager is more of a generalist putting it together, but obviously some projects of a certain size might mean you have a technology-biased project manager... so they’ve got more technical bias. It’s 50% of that role, one 50 is just being the*

*general PM, the other is understanding that I work in the space of applications and they're quite complex."*

However, reliance on explicit knowledge and an exploitative approach is inadequate, as one respondent argued bluntly:

*"You can have somebody that's very good at following process, but is a cr\*p project manager,"*

The project manager role should arguably not aim to be too specialist in terms of work detail, as this may detract from the process of actually managing, and appropriate support from other technical specialists would be expected. Indeed, project management specialism may itself be categorised as a generalist approach. The more senior respondents with greater experience tended to emphasise the importance of the generalist aspect and its role in career success.

*"A generalist, definitely. I specialise in project management if people accept that as a true discipline, because not everyone does. Otherwise, I would say I am a generalist, because I don't specialise in [subject] and I don't specialise technically... I think it's very important to have that background knowledge, to be quite honest, because I find myself asking a few technical questions, and although I don't necessarily need to know the answer, I need to have a good overall understanding, and I think that is one of the things I really enjoy about project managing, is having that overall picture."*

*"I think you do a lot of things because you've had things go wrong before. You remember to check things or not to take certain things people say at face value or to follow through on particular things because you know it is something that might come back and bite you later on in the project. And if it was your first project, it would be a lot harder. Definitely, as you go through your projects, you become battle-scarred and it does help in the next project. Not that you don't make mistakes on the next project, but hopefully you avoid some and make different ones."*

One of the roles of the PM is therefore to ensure that the knowledge of other specialists is integrated and used to deliver the required output. To do this requires an operating knowledge of the work domain, but also a broad overview.

*"I tend to think [of the work] as more of a translation and I think lots of projects are like that because you don't get a project that says you've got to build this service, to this standard and with these parameters... so more and more often projects aren't so much definite in what they're asking, they're quite vague, you then have to translate that into a deliverable."*

*"There's a lot of other stuff in there, experience, man management, ability to build relationships, and they almost go around the outside of the project management 'idealism' if you like."*

Experience also aids in knowing how best to utilise project processes, and what *not* to do. This expertise is best developed through experience and practice, rather than just qualifications, and may be best served by encountering a range of project types, rather than deepening expertise in just one. One programme manager described his approach to developing project managers, by introducing concepts, practice and experience, rather than from theory. The theory and qualifications could come after some 'real-world' introduction.

However, there were contrasting views, in that experience misapplied could be wrong, and that this would be more of an impediment than a benefit. The conception of valuable human capital with regard to the project manager is a complex construct. Epistemologically, the knowledge is heavily embedded in practice, developed through experience and best evaluated through reflection. Sound knowledge of the principles is important, but not sufficient. To progress and develop as a manager, the accumulation of expertise should be augmented with a deeper appreciation of the mechanisms leading to outcomes, although these may be tacit understandings.

*“You don’t think about the lessons learned or the knowledge that you’ve got isn’t the first thing you come across. The first thing you hit is the problem. And quite a lot of project managers are in fire-fighting mode, they are literally attacking problem after problem all the time, and often they don’t get the opportunity almost to reflect on what is the best approach to some of these things, which is really where the lessons learned comes in, it’s the reflections side of thing.”*

Interestingly, there was little if any reference to purely creative aspects of management in terms of the exploratory elements, with no use of concepts such as ‘imagination’ in the HC aspect. Effective learning was conceived in more of a knowledge-based paradigm (albeit with a strong emphasis on practice-based experience and the tacit and explicit knowledge that it builds up), such that the skill of the project manager would be apparent from the application of his or her judgement within project situations. This expertise is hard to capture and transfer, and hence mentoring was mentioned as a method of speeding up learning to avoid a necessarily slow process for all managers, especially when starting out.

#### **4.3.1.1 Summary, Contradictory Evidence and Theory Development**

The interview evidence shows that, in the opinion of the interviewees, project managers use both specialist and generalist HC. Although some respondents appeared to favour one mode over another when asked, upon further discussion they accepted that the other was also prevalent in their work. As part of this analysis, conflicting findings were sought to greater understand the theory and evidence (Eisenhardt, 1989). However, the evidence was for both, and there was no data that contradicted this view or caused it to require modification. This supports the earlier theorisation that both exploitative and exploratory HC forms would be evident as *inputs* in this context.

#### **4.3.1.2 Conceiving and Untangling Human Capital Ambidexterity**

*“These little nuggets you think, oh hang on I’m going to go down that route... it’s not a prescriptive task, you’ve got to use your knowledge, your gut feel, as long as it feels right, go with it.”*

*“I’m not as familiar with the processes as maybe I should be and I think it’s because I’ve got a delivery deadline that’s looming and I feel I don’t have the time to perhaps understand and follow the process so I kind of do what instinctively feels right to get the job done.”*

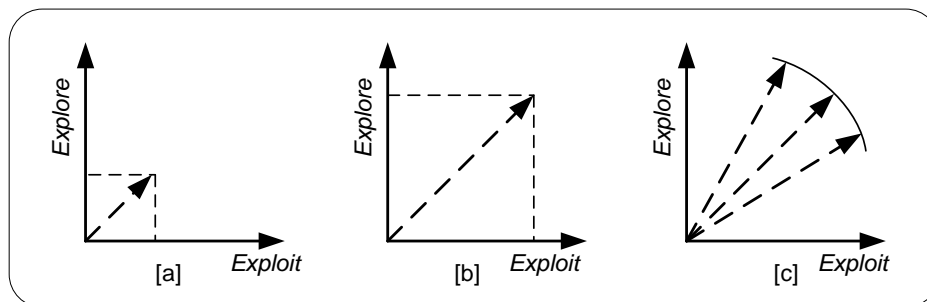
These quotes highlight the complex mix of HC used in the management of projects. The research model takes HC resource as an input to the operational process, yet these are not necessarily passive constructs. The nature of project management is



that the HC is used to orchestrate activities, and the knowledge is utilised day-to-day in order to achieve that. Untangling the *input* from the *activity* is difficult, as will be discussed in more depth later.

Whilst the specialist aspect may be thought of in terms of project management, technical expertise and/or client/industry knowledge, it is possible that increasing specialist knowledge may in fact be detrimental to project performance, for two reasons. Firstly, an over-reliance on exploitative processes and/or previous experience may inhibit flexibility. To rely on your knowledge of company or generic processes, or solutions which have worked before, diminishes the project-specific tailoring and practical judgement that has been highlighted as important in balancing the multiple requirements of a project. Indeed, it is possible that the exploitative elements may be considered as a curvilinear (inverted-U) function, where increasing utilisation is beneficial, reaching a peak beyond which over-reliance provides negative returns. Secondly, if the project manager attempts a strongly exploitative HC approach, this may negate the contribution from the expertise of his or her team.

The opinions given by managers interviewed supported the idea that both exploitative and exploratory HC is useful in their work. Their activities involve both using existing project management practices and, to a varying degree, specialist technical or customer-specific knowledge, together with more generalist business knowledge. Both of these are enhanced by practical experience, and can be understood in terms of knowledge-as-practice, where much tacit experience is gained and drawn upon. However, where previous authors have discussed the balanced and combined magnitude issues between the exploitation and exploration dimensions (e.g. Cao et al., 2009), this potentially highlights a more situation-specific response.



**Figure 52: Human Capital Ambidextrous Design**

In Figure 52 the difference between diagrams [a] and [b] is that the project manager in [b] brings greater specialist and generalist knowledge to the project, and this would generally be preferable to the situation in [a], and is unsurprising. However, in [c], there is a multiplicity of positions and therefore a choice in how to operate. From the interviews, there was evidence of a range of positions a project manager can take, from fulfilling a more technical role, to acting more managerially and delegating much of the technical detail to a specific technical lead. So, even if the project manager is from a technical background (which is a common career route), choices can be made as to how to focus his or her effort on the project.

This is subtly different from contextual ambidexterity (Birkinshaw and Gibson, 2004) in which individuals allocate their time effectively, and can be considered as more of a strategic decision. Here the project manager chooses the areas that are best served by his or her time (technical, general managerial, stakeholder liaison and so forth) and allocated a greater focus to these areas according to the requirements of the project. It can be considered as *second-order contextual ambidexterity*, since

conscious decisions are taken in its implementation. A simple example would be a manager with a technical background choosing not to become too involved in the detail of software coding (even though she could), but instead focusing on the broader management tasks. In this case the deployment of her human capital is chosen to be more exploratory than exploitative, interestingly leading to a lower result on both the balanced and combined dimensions. (Cao et al., 2009). In so doing the choices of how to allocate work and responsibility also highlight an element of structural ambidexterity in that some specialist technical authority is passed to another individual.

This is important in linking back to the ‘how’ of the research question, and highlights that IC can be reconfigured to suit the needs of the project. However, this raises two further aspects that the evidence collected did not answer. Firstly, the temporal issues of how this may change over time is not answered (for example, if a specific technical issue occurred, she may well act to help solve it until it is resolved). Secondly, and linked to the temporal issue, is that this is also an active *orchestration* problem rather than specifically an *input*. The judgement of how best to spend time is dependent upon the issues of the moment, and so that active configuration choice (the use of managerial practices) is also a manifestation of HC. These issues require further study to develop further, and are addressed in the next chapter.

This simple analysis shows that at the micro-level the understanding of ambidexterity using the manager as the unit of analysis is complicated and not as clear-cut as the three main forms of ambidexterity (temporal, structural, contextual) may indicate. These ideas are expanded in the Phase 2 research (multiple case studies) in terms of the practices by which managers can orchestrate ambidexterity.

### 4.3.2 Social Capital

The role of social capital was identified as being highly significant in terms of the effectiveness of the project manager. As highlighted in Table 20, it generated the most coding elements from the analysis. Whilst this is not in itself indicative of value, the responses of the interviewees showed that it was, in their opinions, highly important, and gave many practical examples.

The role of SC was identified as being a key enabler of successful performance, and a differentiator between managers:

*“you’ve got to be very good at communicating on all different levels and that’s hard to quantify... they’ve got maybe the social side of it, it’s one of the key elements then, they’ve got that ability to socialise.”*

Other respondents also identified that SC is an important factor in leadership and in generating a beneficial relationship:

*“People need to share your vision and your goals and in order for people working on your project to share your vision and your goals, you have to have a relationship with them.”*

*“You have to treat different people in different ways in order to get the best out of them and to be prepared to acknowledge how those individuals will interact with each other... to encourage that relationship to build within the team but not be afraid to be perceived as ‘bad cop’ at times.”*

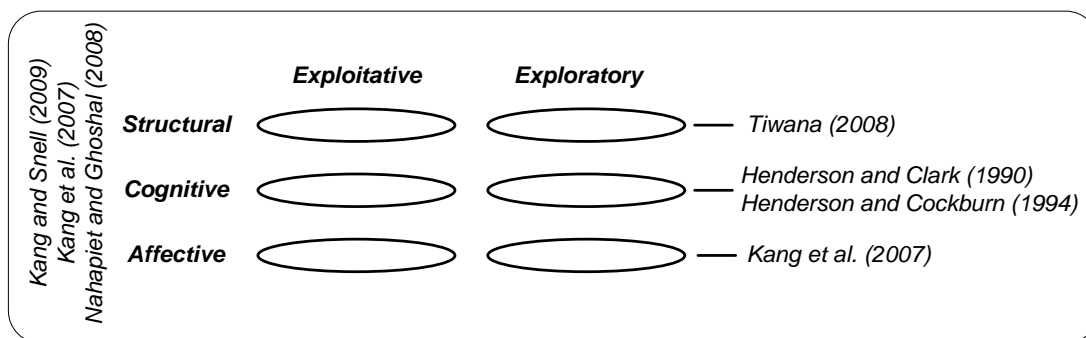
Strong relationships were highlighted as crucial in enabling smooth project functioning:

*“On this account, I’ve been on this for near enough 10 years now. Within [Company] this is a pretty good example of how projects work. We work well with the customer, which is very important, and the technical infrastructure guys, things like that, because you know them you can just walk up and chat with them and if you have an issue you can discuss it with them straight away. So I think the social element is really important to getting a good start and keeping it going.”*

Given the importance of this, it should be a key performance indicator, but the intangibility makes this difficult:

*“Yes we don’t have the people side of it, the things that are easy to measure and then measure ourselves on those because they are easy to measure, we don’t tend to look at the people aspects, the emotional aspects, the social aspects.”*

Numerous facets of social capital emerged from the analysis, and treating them as either exploitative or exploratory (‘cooperative’ or ‘entrepreneurial’ in the terminology of Kang and Snell (2009)) was insufficient to categorise the range of findings. These were not specifically identified within the original theoretical model, and were not coded as sub-categories within Nvivo, but analysed in their entirety subsequently. Drawing on the previously-discussed literature, this analysis now broadly follows the model of Nahapiet and Ghoshal (1998) in terms of *structural*, *cognitive* and *relational/affective* dimensions. This subsequently allows consideration of the findings in light of the work of Kang et al. (2007), which feeds into the theory of Kang and Snell (2009) and hence provides logical consistency for the analysis. The six aspects being sought in line with this theory are highlighted in Figure 53, along with other key literature used in the analysis.



**Figure 53: Social Capital Expectations**

#### 4.3.2.1 Structural Network Aspects

As discussed previously, networks can be understood in terms of strong and weak ties. Exploitative aspects would be characterised by strong ties (i.e. the project team, with frequent communication) and exploratory aspects would be the weak ties, such as occasional contacts, and potentially a range of stakeholders.

*“It’s a whole portfolio, so you are going to have your team, depending on how big your project is, you may have a number of team leaders that you deal with so you’ve got your team and ideally that isn’t too big, you probably*

*want something like 5 people to deal with on a regular basis. Then you're going to have your management chain... Then you've got your client and I typically usually have a client project manager, so they are managing their side of the project and then they have a team as well, so very strong relationships, and then finally a supplier... so 4 groups of people that you are going to have very strong relationships with and then it sort of branches out from there."*

It is the manager's responsibility to ensure that the network functions, and in terms of strong and weak ties. If the network does work effectively, it can be both motivational and also serve as a model for others:

*"Initially, it was networking between individuals and then once we'd established where we were going, then the co-operation kept on improving. When things went horribly wrong elsewhere, we were cited as an example to follow."*

It was clear from the interviews that the role of project manager requires an ambidextrous approach, to build both the team, but also ensure that wider networks are cultivated:

*"Yes, more information ties where you have built the relationship with people who, if they come across a snippet of information they think will be relevant to you they will share with you, so that network is very strong."*

*"And I need to be able to answer questions when the account manager turns round to me and starts to talk about an issue, I don't want to be hearing about it [for the first time], I don't want to then have to go back to the manager and say, what's this about so-and-so? If I encounter surprises, then it's not working. I think that's the best way of summing it up."*

To achieve this involves investment of managers' time, both up-front and on an ongoing basis, to ensure that relationships are built and continue to be effective. The manager is also responsible for developing his or her subordinates in this respect also. The wider network does provide access to new knowledge, although the mechanism may be serendipitous rather than formal:

*"You stumble across things rather than having a formal route to seek out that information. There are lots of examples where a problem is presented to me and again through experience and the network of people I have built up over the years, I know I can go to so-and-so who has encountered a similar problem in a previous life that although I wasn't directly involved in it at the time, I was aware of a similar sort of thing, it might just be as simple as, oh yes, phone so-and-so. So those things happen, but not as structured as it could be."*

*"I ask the implementation people, have they got contacts in the areas that I need? They've provided me with contacts and a person to speak to, and I'll just sit down and work out what to do... We can do it - you just need to know who to talk to to get it done."*

Awareness of which new relationships to build is important:

*"So I only build relationships that I need to, in a sense. I think of myself as a fairly sociable person, so people that I don't necessarily work directly with*

*but that I would sit in the same office with, I would talk to and that comes in useful again, but as you progress throughout the project and the needs of the project change, it's absolutely my job to build those relationships and get people on board doing work for me."*

To use the network, though, means that the communication links must be set up so that its functionality can be established. This may not be straightforward if it is not clear exactly what their roles are, and this may not correspond to their official titles. It may also not be obvious that some of the key communication facilitators may be more junior staff, and the network may hinge on a small number of individuals:

*"It's Joan sat in the clerk's office, everything revolved around Joan. Joan goes and retires, then all of a sudden – urgh! - everything stops!"*

Co-location was established as a powerful facilitator of information flow:

*"Oh God, yes. Given the complexity, you would have to have a hell of an infrastructure, which we don't have, to do things across different places and there isn't much benefit, you'd lose a lot of the team working and stuff that is sort of advantageous."*

*"We are not churning out boxes here, we are doing very much of bespoke systems to incredibly high standards and I feel that is having remotely located both people actually doing production but also support facilities like procurement, invoicing, human resources, adds to the delays and stress in being able to deliver a quality system."*

The more complex relationships, though, can be those with key stakeholders, described by one manager as *"the hard piece"*. On a large deployment, this is a challenging task, especially in terms of influencing the senior management on the customer side.

In terms of ambidexterity, acknowledging the need to satisfy both the needs of the project team and the wider stakeholders is therefore important. To pursue one without supporting the other would make the project less effective. This is not surprising when considering the role of the project manager, yet may be unexpected for, say, a software coder, whose network may be more likely to consist of a smaller number of contacts with strong ties, or a general manager whose involvement in operational detail may be lower. Here, therefore, the project manager network corresponds well to the ideas of Tiwana (2008) that strong ties should complement bridging ties. The PM position is one for which, as might be expected, this configuration is beneficial. We can see that in the structural aspects of SC, both exploitative and exploratory elements are present, in line with Figure 53.

#### **4.3.2.2 Cognitive Aspects – Knowledge Integration and Orchestration**

The theoretical aspects of this can be understood in terms of common architectural knowledge and common component knowledge (i.e. having sufficient detailed knowledge of specific elements, whilst also comprehending the 'bigger picture') (Kang et al., 2007; Henderson and Clark, 1990), together with shared codes, language and narrative (Nahapiet and Ghoshal, 1998). However, a more prevalent aspect of the discussions centred upon the more *active* aspects. The way in which the project manager achieves ambidexterity can be considered in terms of the function of 'knowledge integration' which he/she performs. Here the role of the manager is to both bring together different knowledge domains (where necessary)

whilst keeping an overview of the project (as also indicated under the HC aspect). The project manager needs to ensure that relevant information on issues reaches him or her, but knowing all the details is not always necessary. Importantly, this is inherently a social act.

*“My job is to integrate specialist knowledge to achieve that common understanding. Clearly, at the start of a project there are very few people who know what’s going on, including me. But more often than not the project manager starts up front and certainly in this project, I did have a good grounding of what we were trying to achieve before some other people were brought on board, so it was my job to give them that overview..”*

The leadership role is then to ensure that the right knowledge is available where it is required. It is not always necessary that everyone knows everything, and sometimes experts do not need to be aware of the ‘big picture’ if their input is directed by the manager.

*“Everybody is generally aware of the [business] environment so when we have team meetings the technical team will join the business team and between them they can make discussions that will affect both, so that’s pretty important. I think on my management information project at the moment, we have had to go out within [Company] to a database team, specifically to help us with the database and management of servers. Actually they don’t need to know anything about the big picture, they are purely focused on those servers. That’s the only area they are aware of, sort of thing. But generally, if you are working on a one-year or two-year project, it’s good to make sure everybody has the same understanding.”*

To achieve this level of knowledge integration, the role of effective communication was also highlighted as being fundamental to the role of the project manager. In terms of ambidexterity, all the respondents indicated that their communication style was a balance of informal and formal, with a tendency towards the informal. This was strongly highlighted in the interviews.

*“Absolutely both. I think it’s key to write something down, not just for the litigation folder, so I have formal meetings with my team... but on top of that, there’s lots of informal communication. Picking up the telephone, or an instant message to someone, or turning up on site and physically working next to them, overhearing a conversation across the desk and being able to pick up on that and letting people know what’s going on.”*

There are skills to be learned, and this is inherent in the relationship-building aspect of the project manager role.

*“Yes people say you’ve got to have good written, good verbal, I think more importantly, you’ve got to know how to pitch to certain people, that to me is more important than being able to write a lovely document, you can understand who your audience is, what their motivation is and what’s driving them, so the technical guy building the server, you can have a chat to him about the football and you ask the guy running the department if he’s worrying about his budgets etc., so it just depends on what circumstances, that’s where you’ve got to be adaptable.”*

Sometimes, though, communication effectiveness needs to be context-specific, depending on the work, the customer, team distribution, and so forth. There is no

'one-size-fits-all' approach, and this is a skill that is learned through experience. Co-location is a significant benefit in aiding communication and enabling complex information to be conveyed effectively. There are limitations, though, since communication must be balanced with other tasks:

*"So we do talk, I'd argue that is something we could do more of but it's very, very difficult when you've got a project to run, you've got your day job but then let's talk about the programme, let's talk about the account and the business and everything else. It's finding the time to do all that."*

Whereas the research model considers SC as an input, it is apparent from these comments that the practices described are more of an active orchestration, entwined with the project execution. Knowledge integration can be understood in terms of its social nature, yet it is inherently tends towards more of a dynamic practice. Furthermore, it is harder to disentangle the exploitative and exploratory aspects. In terms of the argument of Henderson and Clark (1990) and Henderson and Cockburn (1994), both common component and common architectural knowledge are important (understanding both the parts and the whole), yet the quotes above highlight that the role of the PM is also to orchestrate and communicate that knowledge, rather than to be the passive accumulator of it.

#### **4.3.2.3 Affective Aspects - the Role of Trust**

Trust emerged as a critical factor in enabling the relationships of the project manager. In the words of one respondent, *"It's essential"*.

*"The trust is the one side where I set someone up with doing something and I'd like it to be done, and I let them get on with it because I don't have the time to be doing it myself. The trust on the other side of things is trusting that people will give you the support as and when you need it... I've got to have trust in superiors and other people that I escalate to, to know that they're dealing with something and can provide me with some support on that."*

However, if the relational dimension, which Nahapiet and Ghoshal (1998) identify as trust, norms, obligation and identification, is insufficient, this can seriously hamper progress on the project, and therefore it is an area that must be carefully managed if projects are to be achieved successfully.

*"...you can have good people but if they are not happy to share that information, they want to keep their arms around it, they are not a team player and they are not keen to share, it's not going to happen, so for me, I think relationships is number one."*

This is not just at the interpersonal level, but also at the inter-organisational level. A strong relationship with the client can significantly aid progress in clarifying requirement and solving problems. This can be particularly difficult in a consortium environment where rival organisations are trying to work together to deliver a common project.

*"I think this comes with the environment. There's minimal trust - maybe it's historic but one thing I've noticed is that there's a sense of 'I can disappear back to my home organisation and you can never find me' – so it's very difficult to build a normal relationship with somebody right, with everybody fighting from a different corner – 'well I'm [Company A], I'm [Company B]'."*

*Immediately people are from different organisations and rival organisations! So you have to get past that, and that's very hard."*

The lack of social relationships can seriously hamper progress in such a complicated environment. As the respondent above continued:

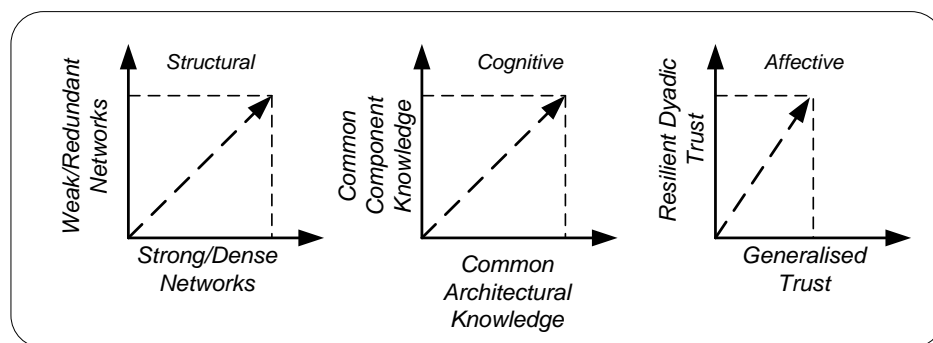
*"These relationships are gone, are burnt, and the people are tired, so what's happening is that the process is driving things."*

This social capital 'gap' is important, as will be discussed further in section 4.6.3.

#### 4.3.2.4 Summary and Contradictory Evidence

The social nature of these projects came through clearly from all the participants. The framework of Nahapiet and Ghoshal (1998) is useful in understanding the findings, and a number of themes are apparent. The structural network of both strong and weak ties is important, as is effective communication, and the practical role of 'knowledge integrator' is a key function for the manager to perform. The opinions of the respondents also indicate that trust is important, so that overall the social elements play a significant role in actually 'getting things done'. Judgement is required, though, since the needs of the team and the needs of stakeholders must be balanced if the project manager's time is limited.

In summary, both exploitative and exploratory structural networks were highlighted in the responses, although there appeared to be a tendency towards more resilient dyadic trust, an exploratory concept. Common component knowledge and common architectural knowledge were both identified as important, and so from this classification there is evidence of project manager SC ambidexterity. This is indicated in Figure 54.



**Figure 54: Social Capital Indications based on Kang et al. (2007)**

These themes were consistent from the respondents, and there were no opposing views.

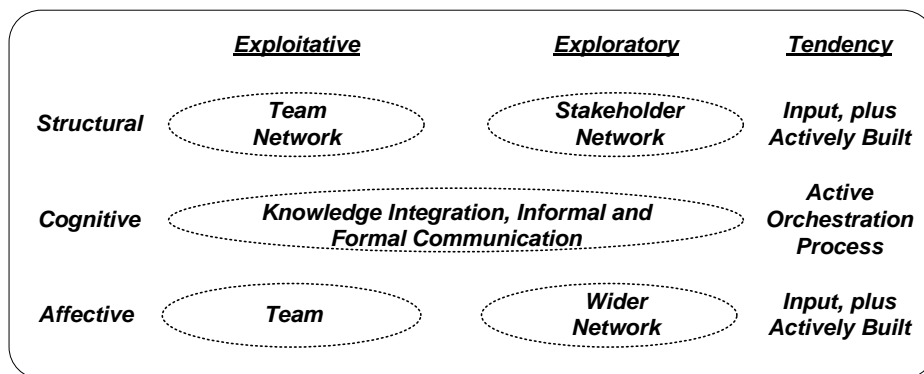
#### 4.3.2.5 Conceiving Social Capital Ambidexterity and Developing Theory

*"A good PM is probably what I'd call a 'wide boy', somebody that can wheel and deal and yes, duck and dive, work in different environments, can talk at the highest levels on that as it were or get down and dirty and talk about the football and have a beer, type thing, because you can transcend all the levels."*



The benefit of effective social relationships in enabling project execution (or, conversely, hindrance from poor relationships) is clear from the interviews. Although ambidexterity has been highlighted, the strength of social capital is in its role as an enabler and in this function it is important in conjunction with project capital, as discussed at length later. A greater understanding of how SC links with the other elements of the research model is developed in section 4.6.

As discussed previously in this section, considering SC as purely an input within the research model is inadequate since much of the discussion reflected a more active role for the PM. As indicated in Figure 55, the features of the three aspects are different. The structural and affective aspects can be more readily understood as exploitative and exploratory, and may be understood in terms of inputs (although clearly they may need to be built at the beginning of the project, then actively maintained). However, the cognitive aspect is harder to identify in terms of exploitative and exploratory features, and also appears to be most important when conceived as an active orchestration process by the manager. This active knowledge integration as an enabler of project delivery is significant, and is brought out further in the Phase 2 case study analysis.



**Figure 55: Social Capital Features**

### 4.3.3 Project Capital

There was a widespread opinion from the respondents that effective project working required both an exploitative framework of processes and structures (mechanistic), together with a flexible approach to accommodate practical issues. This flexible approach is not necessarily exploratory, if it merely involves moving between pre-programmed options. However, practical problem-solving and knowledge generation activities generally have to be supported, and this must be accommodated within the operational environment. This came through clearly from the interviews, and although the respondents varied slightly between their emphasis of each, the use of both was apparent. This tension indicates the ambidexterity within working practices, such that there is a balance between the operational framework and day-to-day process flexibility.

*“Obviously Defence has its constraints. Commercially we have constraints provided by [named] documents and ISO standards and all those sorts of rules and regulations that are constraints or frameworks in which we operate, but in terms of day-to-day working practices, processes are fluid.”*

*“At a high level it’s structured, so I’d say it’s more of a framework to operate in. Whereas you’ve got very fluid local processes fit within that framework, so you have a boundary that is established for you, and you know the limitations of that boundary, but how you operate within it is very fluid.”*

*“Officially? Officially, one follows a process and works to this big document... Once you’ve done those documents, you go, ‘Right, there you go, that’s the audit sorted, now let’s get on with the project!’”*

Managers had a range of views regarding how these two should be balanced, and this was dependent upon the project context and the individuals he or she worked with. Some mentioned the detailed ‘tick-box’ process audits that did not necessarily aid in meeting the customer’s needs, but part of the job involved passing those audits whilst focusing on the bigger project objectives. Managing this PC requires experience and judgement, and this interaction of PC and HC is discussed further in section 4.6.

It was clear that the solid process-based approach could be a target, but no projects were that clear-cut. Attempts to run the whole organisation like a machine would be too simplistic and not take account of practical reality. To consider organic and mechanistic as two ends of a linear spectrum, however, is insufficient. High-level process structures can aid flexibility and exploratory studies, deliberately blending exploration into the formal project process.

*“So it’s basically you have an initiation phase, an elaboration phase, and they’re the sort of, the first one is start-up phase, the second is trying to de-risk the main high risk components, then you go into construction phase. You could have two or three elaboration phases and they did on [project name] to de-risk that, so... by the time you come into construction, you should have de-risked the project.”*

For high-novelty projects, though, working with the standard company-wide processes may be inadequate:

*“Where I am now [novel product development], there is no real process in that respect for it. It’s really sort of dealing with what comes out. ... I have to admit, the sort of projects we do are difficult because a lot of those [Company-wide] processes are there for straight-coding IT-type projects and it’s sometimes hard to fit that in.”*

In contrast, some situations mean that there are constraints on flexibility if customer-mandated processes must be followed.

One interesting example of ambidexterity is the use of ‘what if’ scenario planning. This involves the programme manager analysing the effects of multiple project decisions such that outcomes can be looked at from a higher level, especially regarding resourcing. It involves both the judgement of the participants but also software tools that can represent the accumulation of multiple plans at the enterprise level. This incorporates both the sophisticated planning that allows the technique to function, whilst also accommodating the flexibility of exploring alternative solutions. Similarly, budgeting for unknown changes was used by some respondents to allow for refinement and to accommodate unforeseen problems.

#### **4.3.3.1 Project Knowledge**

A key aspect of project capital was to establish where project knowledge resides. Overwhelmingly the responses highlighted that knowledge of the project was within individuals. Much of the project work is documented in detail, but this is not sufficient.

*“It’s not captured very well. It tends to sit inside the grey matter of project managers and project experts.”*

*“You can have as much information stored wherever you like, your Sharepoint sites, your file shares, you’ve got no knowledge, just loads of information, so the knowledge that people accrue, unfortunately, is stored in their head.”*

*“It should be I guess in the project documentation. So if you went to the project workbook and picked out the key documents, that would tell you something about the project, but actually a lot of it, if you wanted the flesh behind the bones, it would be in the people’s head, really.”*

Although lessons-learned meetings are held as knowledge-capturing events, often the movement of staff is the way that project-to-project learning is shared in practice (such as the rotation of military staff). This widens the network of contacts and ensures that experience is moved around the organisation, but also means that individuals move mid-project, and handing over may be insufficient.

*“It’s interesting because I’m about to hand over two of the projects, three of the projects and people always say to you, can you hand over, where’s the documents? And you go, ‘there’s a scope here, there’s perhaps 50% of the design there’, but obviously designs change as you find out more, so actually, yes I can give you that and I’ll give you the basics, but you need to sit down and talk with me, you need to sit down and talk with my team members to really get the most of it.”*

#### **4.3.3.2 Project Capital - Mechanistic**

Examples of exploitative (‘mechanistic’) PC were readily apparent, specifically project processes, including reporting, documentation requirements and auditing that had been developed over time, and learning lessons from other projects. The processes in place and the lesson-learned activities were not always hailed as successful, but certainly provided the framework for project operations and ongoing improvements.

*“There’s plenty of support processes and reporting that I need to do which is more rigid than anyone would care to believe and so I have to fit within that.”*

*“It [process] doesn’t drive performance. If it wasn’t there, it’s very easy to be chaotic so it’s in its rightful place, supporting the project. It gives me some boundaries to work within, it gives me a structure to escalate problems.”*

These elements of project capital are unsurprising, and supported by the interview participants. The individuals’ comments ranged from project situations with seemingly too much process, inhibiting creativity, to those with too little, requiring more control to be added. The effectiveness of their projects’ process-based approaches was also identified as being less than ideal, but this is in line with previous literature. Lessons-learned processes were performed, but the documentation side of this was not generally considered particularly valuable.

*“That’s one of the big bug-bears with me. Sometimes you produce documents just for the sake of producing documents. Do they give any benefit? No. Or when they do give you benefit is when everything goes*

*wrong. And then you can say, ‘Oh look, there’s a document that tells you why it went wrong’.*”

#### **4.3.3.3 Project Capital - Organic**

The organic (exploratory) aspects of project capital also came through strongly.

*“I think the other thing is the science supports the art, you can’t have one without the other but it is the art that you have to be, I said entrepreneurial, it’s a similar sort of approach at the end of the day.”*

*“In the first instance, yes, rely on your processes and so on which I think from past experience because if you like they are a sort of crutch holding you up and then at some point perhaps you realise, that’s when the innovation comes in and you suddenly realise the scope of your problem and set about fixing it.”*

The ability to circumvent the established process was also important in achieving this, as was the ability to understand the most problematic elements and plan accordingly. Although the solutions cannot be foreseen ahead of time, anticipation of difficulty allows appropriate scheduling. At a high level, acceptance of this uncertainty allows a structured, investigative, approach:

*“[T]hey don’t really understand what the outcome is, therefore you kick off more exploratory work to understand, or to try and find better the requirement, or even do some solutioning, which is where you go into the iterative process.”*

However, although organic PC was identified, it was linked strongly with both the mechanistic PC and the exploit/explore process activities and was difficult to identify as a stand-alone element. This is discussed in more depth in section 4.6.

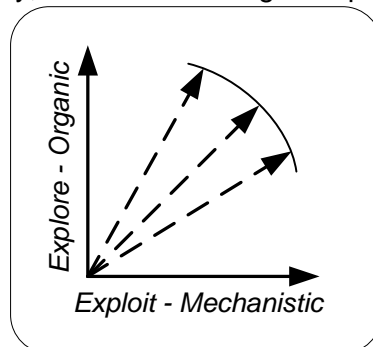
#### **4.3.3.4 Ambidexterity, Contradictory Evidence, Theory Development and Summary**

The twin elements of mechanistic and organic project capital were supported by the interview participants. The individuals’ comments included examples of too much, and too little, control. The requirement to be relatively flexible to overcome specific project issues, including deliberate planning to address the biggest challenges first and better understand the nature of the problem, is an important aspect in building that flexibility. The findings corresponded with my expectations and practical experience of these concepts, and this bias is acknowledged.

There was strong consistency in these views, with respondents supporting the view that both aspects were required within the management of projects. Although preferences towards more of a mechanistic or organic approach varied, there were no contradictory pieces of evidence arguing strongly for the domination of one over the other. Ambidexterity incorporating both mechanistic and organic project capital can be established.

*“You need to follow some processes on one scale, and on another, you need to be very focused on what you are delivering to the customer and making sure. So I think they fall to some sort of terminology, healthy cynicism or something like that... so [Company] may be saying, ‘You should be doing it this way’, but you should be challenging it all the time.”*

As shown in Figure 56 below, accommodating both aspects shows that ambidextrous PC is present, but there are a range of implementations (i.e. potentially with one mode more prevalent than the other). Figure 56 is intended as a simplified representation only, since a wide range of options are available.



**Figure 56: Representation of Project Capital Ambidexterity**

Although we can identify both mechanistic and organic PC, considering these solely as ‘inputs’ to a process does not fully explain their value or operation. As inputs, PC includes such items as processes and operating methodologies, including problem-solving approaches. However, as will be discussed, a fuller understanding of the input-process-output model is gained by considering not just the elements within the research model, but also their interaction. This is particularly important for PC, as discussing process and operational *inputs* without reference to the actual *processes* of exploitation and exploration may miss the richness gained from the research.

#### 4.3.4 Summary of IC Configuration and Further Research

The model of Kang and Snell (2009) hypothesises two alternative compositions to achieve ambidexterity using human capital, social capital and organisational (project) capital, utilising a *three-of-six* configuration. Initial coding of the responses in this research, however, showed that using the project manager as the unit of analysis, and considering HC, SC and PC, *all six* of these were identified. The context of the management of IT projects is found to exhibit all the elements, and this is in line with the theory developed earlier.

However, the analysis also highlights more questions required to answer the ‘*how*’ of ambidexterity. The role of the manager is one of an *orchestrator* of IC. To conceive of IC as only an input neglects the active, dynamic aspects that have been highlighted (including the choice of how the PM utilises his/her HC, and the important responsibility of knowledge integration). This requires additional investigation to further explain how these resources are utilised.

A more detailed understanding of the exploitative and exploratory processes is also required to further address Sub-RQ2:

***Sub-RQ2: ‘How do exploitation and exploration occur at the level of the project?’***

#### 4.4 Process Configuration

Within the research model, the IC is theorised to enable ambidexterity via the exploitation and exploration processes, and therefore it is necessary that this be

supported by evidence from the interviews. Whilst the *six-of-six* IC configuration was evident from the respondents, evidence of exploitation and exploration processes were more challenging to extract and code successfully. This in itself is a useful finding, and high-level evidence is now presented before more detailed discussion.

#### 4.4.1 Process – Exploitation

As discussed, the research model suggests that the process of exploitation should ideally be distinguished from the inputs to that process. However, the exploitative acts are frequently difficult to differentiate fully from the PC inputs. Nevertheless, specific examples of ‘doing’ were identified. Key coding elements that came out of the interviews regarding exploitation were the implementation of lessons-learned systems (both within and between projects), and the necessity of change-control systems to capture and document requirement changes through the duration of the project. As the work progresses, new findings are made or ideas clarified, necessitating a change to the project deliverables. Exploitative systems in place to enable this to happen are part of the project capital (and thus *input* and *process* are intertwined). These can be overseen by an Enterprise Programme Office (EPO) or Project Management Office (PMO) such that the processes are not only in place, but used consistently by multiple projects within an account.

As mentioned, a practical interviewing problem was that the respondents had difficulty identifying specifics of knowledge refinement as discrete activities. Specifically, the nature of this type of project management (with the perspective my personal experience) is that this much of the day-to-day activity is determined by the tasks and objectives that have to be achieved, and is difficult to identify specifically in terms of the constructs discussed. This was best summarised by one respondent, who said:

*“That’s not necessarily organisational learning, that’s kind of ‘problem-solving’”*

Another elucidated the practicalities of the role well, highlighting the difficulties of distinguishing between exploitation and exploration:

*“I think we are doing knowledge refinement all the time. For example, you start a project, you know you’ve got to write the scope, you go to the corporate repository and you’ll get a template out and you go through that and you’ll be saying, there are things that we don’t need this or we need something else, so that there’s a certain amount of tailoring to your project... you tinker with things, communication is something you tinker with a lot, you might think you need weekly meetings then you decide it’s monthly meetings, or vice versa, and you work until your communication’s correct, and I think you do a lot of learning throughout the project and that is something that’s constantly done. You don’t even think of it as learning... You think, I’ve got this problem, what do I need to do to solve this problem? I tend to sort of put the knowledge generation in that innovation category which is usually when somebody asks you what innovations have you done? I always find it a hard one to do. I probably do it, I just don’t recognise it.”*

In this respect, I have also found it difficult to determine boundaries to these constructs, and this is discussed further in section 4.4.3.

#### 4.4.2 Process – Exploration

There were other strong examples of the enacting of exploration processes:

Effective technical prototyping could be used to explore the most appropriate way forward, but it was accepted that sometimes a new solution would be found, or that one would be required at some point in the work.

*“I had to test 25,000 machines across Europe to make sure they’d go through and we had this tool that we were given which was basically very drawn-out and long-winded, we did some search on the internet and found out a tool that basically did it automatically and built up a database for you, so you could see for all your people their names, it came up with type in your name, it did a little test and dumped it at a database and we basically got that approved, went to San Francisco, met this company, very young start up, first major customer, we bought the products, rolled it out across Europe... there was a lot of that – yes, so that’s just by looking at what’s happening at the moment, thinking ‘we can do this better’ and I think that’s what makes a good PM it’s not just taking what’s there but questioning it and see if you can improve.”*

*“We had people from the operation, technical people, we had business people from programme level and from project level and we all sat round the table and what could we do to get around this and at the end of the day, we’ve come up with a different approach.”*

*“You kick your plan off, and then you’re running with it, and this black hole might not even be visible at the beginning of it, it might come half way along, there’s a block and you think ‘Christ, I don’t know how to do that!’”*

*“So that’s why virtualisation came along, suddenly you’ve got several data centres based around the new project as every project that comes along says ‘Oh, I need twenty of those, two hundred of those...’ we’ve changed radically because by the time we’ve got through design, suddenly our solution we envisaged being 2 million is now a 20 million pound cost that the customer’s got to pay for. So we’ve had to stop that piece of work and totally rethink the solution.”*

#### 4.4.3 Conception of Ambidexterity

Although the conception of exploitation and exploration may be understood in terms of March (1991), during practical coding I found that these terms were not sufficient to code many of the examples given by the respondents. Specifically, whilst end-points of exploitation and exploration are theoretically well-conceived, there are multiple examples that fall mid-way, or could be understood as both simultaneously. Given the manifold interpretations of the terminology, and hence the lack of a formal set of widely-accepted criteria, a rigorous classification is inappropriate. Referring back to the definition used within this thesis (exploitation: “refining project knowledge”; exploration: “generating new project knowledge”), the following quotes show the difficulty in attributing single codes to learning processes, where both exploitation and exploration may be understood. However, there is ambiguity in assigning these definitions, and so there is a necessary element of subjectivity in attempting to understand the processes.

*"I guess it's managed inasmuch as once you have found something out you need to test your understanding of that and therefore if you find something out that changes the direction you need to take, I guess the management of that new piece of information will be to get all your interested parties together and understand the impact of your new information and make sure that the information is then shared with the people that need to know... I guess that would be formally in the team meetings. We would discuss key changes that need to be made. There's nothing much more formal than that, actually."*

*"It's a bit of a kind way of looking at it, because I always feel that we miss something at the beginning and it's not so much a learning as oh, another change we mucked up, we haven't got it right. At the beginning we should have realised that was never going to work and we should have known to go this other path instead, which actually we didn't know at the beginning, and you have to do so much activity before that becomes apparent but you kind of are always wishing or thinking, could I have done something in the beginning to flesh that out so that we would originally have gone down the right path."*

Each of the above quotes could be understood solely as exploitation, since the project knowledge is being refined. However, each can also represent knowledge generation. To formally distinguish between the two may be counterproductive, and greater understanding may be generated by considering them as interwoven in both form and time.

This argument may be further expanded by the consideration of incremental changes, as in the quote below.

*"We've just had a figure quoted: we started five years ago and in that time we've had thirty thousand change requests. So you've got to manage that as well haven't you?... So what you actually envisage at the start, like many, many, [defence] projects will be something like what you've imagined when you're finished, it'll be a common core infrastructure that everyone uses, but whether it's exactly the same as what the plan from the start was..."*

Whilst incremental change can generally be understood as exploitation, after thousands of changes and major (originally unanticipated) technical and operational changes to the initial requirement, with significant challenges overcome (as occurred on this particular project), it is clear that new knowledge has been generated – and hence can be considered as exploration. However, putting firm boundaries between these two terms may not be practical.

Project change control can also be understood in terms of ambidexterity. Small low-level changes can be exploitative (and may in fact need very little process), whereas high-level changes may be more exploratory, paradoxically actually being more process-based.

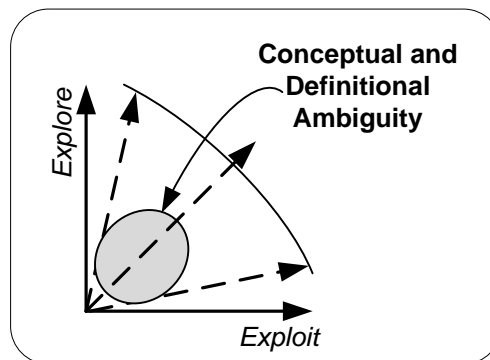
*"There's probably 2 levels of changes. One of which is at a contractual-level and another which is more at a project-level. So there's an awful lot of changes at a project-level that needs to happen. Small adjustments and stuff like that, that need to be kept away from the contract... and I think it's very important that projects have I think discussions about change and contingency, that's essential."*



*“I think [change control] it’s a combination of both [exploitation and exploration], because it can really depend on the contract you’ve got in place and how flexible you can be with these things.”*

*“I always wonder when we get these stats about 70% of projects fail, on time, on budget to quality, measures, I think that is because we measure that success against the original baseline, even if there was a baseline, and that very few projects manage the baseline well to be able to such an extent to say, OK, we didn’t hit these because we had so many changes, but we managed the changes within the scope that we did, and therefore we hit it.”*

Major and minor changes are therefore a reality for projects, yet these do not all easily fit into an orthogonal view of ambidexterity. Whilst examples of exploitation and exploration are evident, a simple understanding of their co-existence is challenging. This leads to the situation of Figure 57, whereby the ‘endpoints’ of the constructs are identifiable, but other aspects (as highlighted above) provide significant difficulty and ambiguity, especially when attempting to understand ambidexterity in terms of the existence of exploitation and exploration.



**Figure 57: Ambiguity in the Ambidexterity Process**

#### **4.4.3.1 Broad or Narrow Concepts?**

In this section and in section 4.4.3.2, new literature is introduced as a basis to further the discussion of the findings. This is then expanded in section 4.6 to generate further understanding from the data.

This issue of ambiguity must be understood in the context of the research. The literature does not provide firm definitions of exploitation and exploration (Su, 2011), since they are intended to be generalisable, and this issue is in line with Suddaby (2010) who discusses the nature and use of constructs. As he discusses, the use of the word ‘construct’ may be associated with positivism by some scholars, and an alternative of ‘concept’ may be used by those from a constructionist perspective. The word ‘construct’ will be used in this thesis, and potential issues with interpretation are acknowledged.

Suddaby defines constructs as “conceptual abstractions of phenomena that cannot be directly observed” (2010:346). Kerlinger defines a construct as a concept that has “been deliberately and consciously invented or adopted for a special scientific purpose” (1973:29, cited in Suddaby, 2010:346). Priem and Butler (2001) also argue that constructs are abstract statements of categories of observations. There has been debate about whether constructs should largely precede qualitative research (Eisenhardt, 1989; Eisenhardt, 1991) or whether they should emerge from the data (Dyer and Wilkins, 1991). Dyer and Wilkins (1991) indeed suggest

(perhaps rather worryingly) that researchers ought to aim for ‘good stories’ rather than ‘good constructs’.

There is also a debate within the literature regarding the broad or narrow nature of the constructs. Suddaby (2010:348) writes that “Effective constructs create broad categories and, thus, should not be reducible to narrow empirical observations. Some degree of linguistic ambiguity is therefore a useful component of any theoretical construct.” Hirsch and Levin (1999) argue that constructs can be ‘umbrellas’, covering broad principles, but that these can be criticised by the ‘validity police’ who seek to tighten the ideas more rigorously. This is an underlying, and healthy, tension within academic research, and ideas can go through a life-cycle of initial excitement, critique and acceptance.

The concepts of exploitation and exploration are *umbrella* concepts, and, in the terms of Suddaby (2010:354), “should be viewed as large buckets or broad concepts loosely defined because this better captures the inherent complexity and messiness of the empirical world we study.” Whilst empirical testing may require more tightly-defined ‘buckets’ for a particular context, this terminology is extensively used and broadly interpreted. I will not attempt to rigorously classify activities against the terminology as it would potentially be arbitrary, and would not serve the research question. This is also supported by Su (2011). Instead, it is more insightful to understand how exploitation and exploration may coexist and the underlying theoretical basis.

#### 4.4.3.2 Exploit and Explore - Dualism or Duality?

How can we better understand this difficulty? Farjoun (2010) contends that stability and change, in terms of exploitation and exploration, should not be considered as a *dualism* where one precludes the other, but as a *duality*, whereby stability may enable change, and change may enable stability. By distinguishing between mechanisms and outputs (Figure 58), this may be better understood.

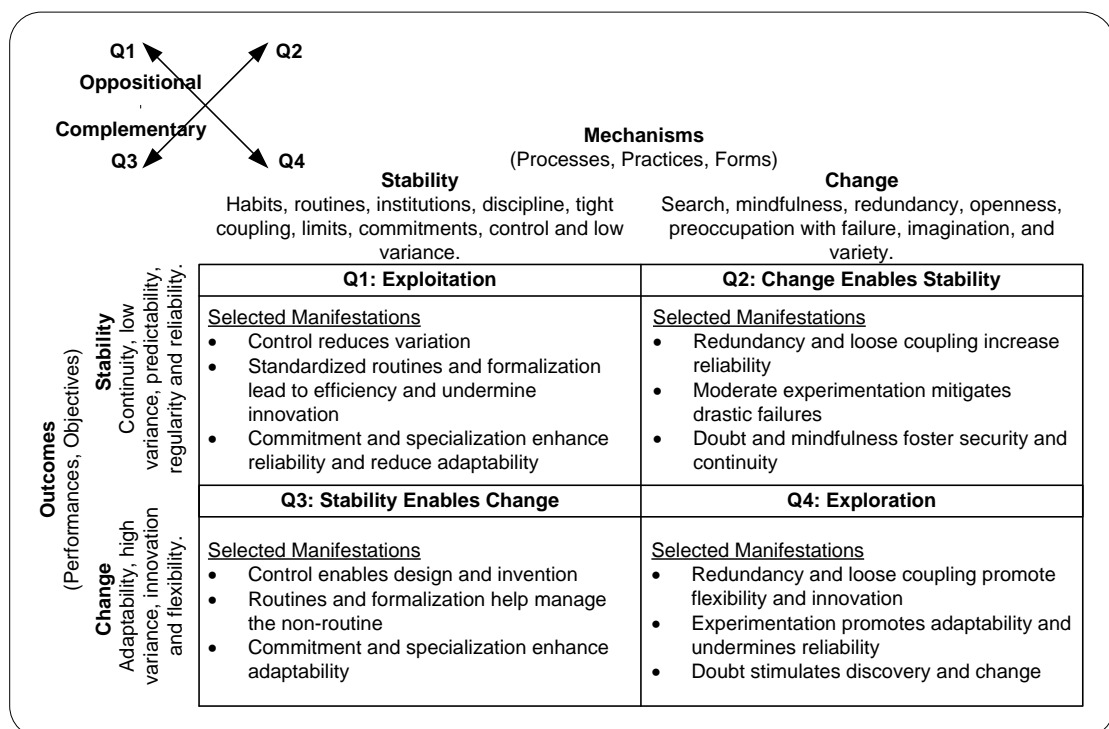


Figure 58: Farjoun (2010) Model

Farjoun (2010) argues that examples of where change and variation enable stability include high-reliability organisations, where stability requires internal variation and effort. This can mean redundancy and loose coupling, moderate experimentation and mindfulness (fostering security by encouraging doubt). Conversely, stability can enable change and adaptability through the application of control systems, individual heuristics for problem-solving, and the adaptability gained through specialisation.

Although Farjoun (2010) looks at the organisational level, these ideas can also be applied to the role of the manager in projects. Exploitation and exploration can be identified, but so can their mutual interdependence and complementarities. The consideration of the constructs as a duality allows an enhanced understanding of ambidexterity. He comments on this: “Duality suggests instead that stability and change in different units and hierarchical levels may intertwine and depend on common practices and that rather than negating and displacing one another, they can mutually reinforce each other in a process of renewal.” (2010:218). The acceptance of the duality model may necessitate the recognition of the entwined nature of the constructs, as discussed from the interview evidence above, such that “the duality view casts doubts on organizations’ ability to separate elements of stability and change so neatly. Individuals engaged in routine tasks exercise some degree of experimentation, and those engaged in creative tasks use routines to some degree.” (2010:218).

This view is therefore in line with the findings from the first phase of the research, in that “duality-informed solutions provide new modeling opportunities to dissolve and overcome the paradox of stability and change. By stressing stability and change as interrelated, mutually enabling, and overlapping in space and time, such solutions enable organizations to retain some of the benefits of bureaucracy and anarchy without committing to all their liabilities, and they foster renewal while limiting the pains of comprehensive change.” (Farjoun, 2010:219).

The duality concept sheds light on the understanding of project manager ambidexterity, and provides a rationale as to why disentangling the concepts is challenging and perhaps counterproductive. The exploration and exploitation constructs can therefore be considered as separate yet intertwined, evolving and interacting over the duration of the project. This is a difficult concept to describe, yet a visual representation such as the *double-helix* from the biological world provides a comparison. Here we have the two strands (exploitation and exploration), intertwined and joined, existing, in this context, over time. As will be shown, this complex interaction extends to the other research model elements as well.

#### 4.5 Output

This is the final part of the research model. Many of the interviewees responded with the usual ‘time, cost and quality’ response to the issue of assessing project outcomes. Some, however, looked beyond this to suggest further concepts.

*“Not just on budget, on time, we tend to focus too much on that. Where we take a pulse of the clients, how do they feel about it? Because it could be on time, on budget but the perception is rubbish.”*

*“To me, the success is getting the system in, and it works, and it’s delivering benefits. Yes, I think cost and timing are important, but these are estimates*

*at the beginning of the project. So delivering what you said you were going to deliver is the most important thing.”*

*“A successful one is where we all come out of it smiling. The customers are pleased, we are pleased that it’s theoretically a fair profit on our side, we are not seen as taking advantage, the relationships are built, the people are happy to work with you on another project, the team are happy to work with you because you have looked after them along the way. So I think everybody needs to be happy.”*

*“I think from a subjective point of view, that sense of a job well done which would be in my case very much end-users are appreciative of what’s being done, rather than the contractual customer.”*

*“The outcome is ‘Have you provided a product that the business needs, within the cost and time?’ but that is the outcome, does it support the business? I think a lot of people forget that. At the end of the day, depending on how low the project goes to, the product has got to fit within the business requirement and the strategy of the organisation.”*

Given the difficulty of reliably assessing project outcomes, the next stage of the research does not use project-manager-reported outcomes, but a more objective method based on Company performance measures. Self-reported data introduces the problem of *common method variance* (Campbell and Fiske, 1959; Fiske, 1982). A practical method of overcoming this is the separation of measurements, and in this case using alternative, external, sources of data for the output measurement to ensure no correlation between this and the respondent. As discussed, this was an integral part of the case sampling criteria.

## **4.6 Coding Analysis – Re-conceiving the Research Model**

Following the findings that the ‘six-box’ exploit/explore HC/SC/PC model was validated and that the duality concept of Farjoun (2010) could further explain the nature of ambidexterity, further analysis of the interview data was undertaken. As alluded to earlier, the initial coding was difficult since the coding structure was based on the input-process-output research model and many of the examples could be coded using multiple codes. This could be attributed in part to the difficulty and ambiguity within the act of coding. Saldaña (2009:4) acknowledges that “[c]oding is not a precise science; it’s primarily an interpretive act.” For the further analysis, the interviews were re-coded with the objective of looking for interactions between the elements of the research model. This proved to be a rich source of further explanation, since rather than seeking the ‘primary’ codes, specifically seeking the interactions showed a multitude of interaction mechanisms.

### **4.6.1 Method**

As mentioned in section 4.1.2, parallel-coding (King, 2004) was also performed on the interview data to indicate how sections of evidence could be coded using multiple codes. Given the difficulty of exploitation / exploration above, it was evident that there were strong inter-linkages between the elements of the research model, and to conceive of them in isolation was inadequate

Saldaña (2009:62) calls the technique “simultaneous coding”, although advises caution in its use as it may appear to indicate indecisiveness on the part of the researcher. However, in seeking to specifically identify the co-occurrence and

interaction of constructs (see also Bazeley, 2007:71-3), I argue that the applicability here is advocated due to the purpose of its application. Miles and Huberman (1994:66) advise: “Multiple coding is warranted if a segment is both descriptively and inferentially meaningful.”

A further coding representation scheme was implemented to identify those links. A simple nomenclature was developed to allow depiction of the multiple forms of interaction possible. This is shown in Table 21, showing the HC, SC, PC and Process (coded 'X'). Hence a section utilising exploitative and exploratory human capital, exploitative social capital and exploration would be labelled 'HC-SC1-X2'. Note that, for example, exploitative and exploratory human capital are not identified as an interaction in the same way, only interactions between different high-level constructs, such as SC and PC.

**Table 21: Identification - Parallel Coding Structure**

HC	HC1 - Exploit	HC2 - Explore	HC – Exploit and Explore
SC	SC1 - Exploit	SC2 - Explore	SC – Exploit and Explore
PC	PC1 - Exploit	PC2 - Explore	PC – Exploit and Explore
X	X1 – Exploit Process	X2 – Explore Process	X – Exploit and Explore
Op	Op - Output		

#### 4.6.2 Results

Table 22 shows the results of the analysis. A total of 48 different combinations were identified, with 181 instances. It should be highlighted that the coding performed involved an element of subjectivity, and although as the single researcher I attempted to ensure consistency, the interpretivist nature of the work means that other researchers may generate different results. This was exacerbated by the difficulty of assigning codes given the broad definitions of each of the constructs. As discussed in the previous section, the use of ‘umbrella’ concepts (Hirsch and Levin, 1999) resulted in challenges in attributing specific codes in practical application. This has been discussed in terms of exploitation and exploration, but was also applicable to the intellectual capital elements.

**Table 22: Parallel-Coding Structure Results**

Coding	Sources	Refs.
HC1-PC1	6	14
HC1-PC1-X	1	1
HC1-PC1-X1	7	7
HC1-PC-X	1	1
HC1-SC	1	1
HC1-SC1	4	4
HC1-SC1-PC	1	1
HC1-SC1-PC1	5	6
HC1-SC1-PC1-X1	3	6
HC1-SC-PC1	1	1
HC1-X1	1	1
HC2-PC-X	1	1
HC2-SC1	1	1

HC2-SC2	1	1
HC2-SC2-PC2-X2	1	1
HC2-X2	3	3
HC-PC	3	5
HC-PC-X	2	4
HC-SC	4	6
HC-SC1	1	1
HC-SC1-X2	1	1
HC-SC-PC1	1	1
HC-SC-PC-X	3	4
HC-SC-X	1	1
HC-X	2	2
PC1-X	4	4
PC1-X1	13	30
PC1-X2	1	1
PC2-X2	1	1
PC-X	8	14
PC-X1	5	5
PC-X2	1	1
SC1-X1	2	2
SC2-PC1	1	1
SC2-PC1-X	1	1
SC2-PC1-X2	4	5
SC2-X2	1	1
SC-PC1	6	10
SC-PC1-X1	5	6
SC-PC-X	1	1
SC-PC-X1-Op	1	1
SC-Op	1	1
SC-PC	4	4
SC-PC1	4	4
SC-PC1-X	1	1
SC-PC-X	5	8
SC-PC-X2	1	1
X1-Op	3	3

It can be seen from Table 22 that there are many variations of the interactions that were identified. Whilst it is not intended that the number of sources and references is directly linked to significance, there are some common themes that emerge.

PC1-X1, with 13 sources and 30 references, is by far the most prevalent, and PC-X has 8 and 14 respectively. This indicates the difficulty of distinguishing between the *input* of project capital as a resource and the enacting of the *process*, as discussed previously. By considering the tools brought to the project and the use of those in practice, it is clear that considering one aspect without the other limits our understanding, and reinforces the epistemological idea of practice.

*“We had a process where the customer would come to us with a suggestion, shall we say and then we would cost that one up and then it would go to the change board and then they would make a decision. To cost up the estimate it would be anything from 2 hours to a day’s work. What we were finding was that the customer was asking for an awful lot of changes, but not many were getting approved, so we were spending a lot of time on unapproved work.*

*And so, we escalated this and the customer agreed that there would be a process in place where the idea got approved first, then estimated and then they decided to do the work.”*

*“Yeah, ‘cause things change and you realise people can do it quicker, or you realise that there’s an extra bit with more complexity, so you refine your plan. I’ll be honest with you – the way I think about planning is that you should plan up-front, but in theory, while you’re running your project your plan is just the road that you travel – you shouldn’t necessarily be watching every bump on that road. You’ll go like this but as long as the end destination is the same - that’s how I feel you should manage... You know generally where you are. I mean you check it now and again.”*

Representative examples of the linkages are given in Table 23. Some of the quotes are taken out of their wider context and/or have been shortened from the full coded section, but are given to highlight examples of the inter-linkages that were identified.

Note that although the unit of analysis is the manager, some of the evidence involved other project members and their human capital. Since the interaction with that HC is integral to project operations, it is important in the wider perspective although it is acknowledged that it is stepping outside the specific bounds of the unit of analysis.

The coding shown in Table 23 was taken at the level of the sense of the paragraph rather than at the level of the sentence. As an example of the method, consider the first quote (HC1-PC1).

*“I think the approach I like is have the detailed process but it’s like a library just go in and say yes I want this, this and this, I’m not going to take every book off the shelf, I just know for these circumstances I need X, Y, Z and that’s the approach I prefer.... but you’ve got to have the required knowledge, experience, to know that you just want this, this and this, you can’t just walk in off the street and say I’ll have A, B and C, when you actually want X, Y and Z.”*

This shows that the utilisation of project processes by the manager is not simply the adoption of standard procedures as defined by the Company (PC1), but that practical choice is also determined by the manager’s experience of their utilisation. Thus the process choice is influenced by his or her HC, and in turn the utilisation of previous experience (HC1) is indeed a significant input to the project. The inputs of HC1 and PC1 are therefore combined to create a unique set of conditions (another manager may approach the problem from a different perspective and history), and to code as purely one or the other would miss this important subtlety.

The analysis also encompassed areas wider than the specific project-related tasks, though, further showing that the managerial role can be understood both in terms of personal and organisational improvement (HC1-PC1-SC).

*“I get lots of phone calls and emails because people tend to know that I’m quite interested in methodologies and process, so I get questions from people I don’t know... For example someone came to me for [project] ‘health checks’, it’s only because I quite enjoy doing them and that sense of achievement helping people develop and grow but then by association you come as the expert on doing those... people know that if they come to me I*

*should be able to help you out, but there's nothing written down anyway to say that it's me."*

The data presented in Table 23 is significant in that it highlights the practical reality of the interaction of the elements, and the richness of the responses indicate how the theoretical constructs are used in the day-to-day activities of managers. The multiplicity of themes and stories do not readily lend themselves to a 'simple' understanding of managerial operation, but instead provide the evidence of the many aspects that are integrated within the role. By reading the quotes, this complication is evident, and analysis is presented afterwards to highlight the specific interactions identified.

**Table 23: Parallel-Coding Analysis – Representative Quotes**

<b>Coding</b>	<b>Example Quote</b>
HC1-PC1	<i>I think the approach I like is have the detailed process but it's like a library just go in and say yes I want this, this and this, I'm not going to take every book off the shelf, I just know for these circumstances I need X, Y, Z and that's the approach I prefer.... but you've got to have the required knowledge, experience, to know that you just want this, this and this, you can't just walk in off the street and say I'll have A, B and C, when you actually want X, Y and Z.</i>
HC1-PC1-SC1	<i>[Project knowledge] Obviously a huge amount in people's heads, we do have a huge amount of corporate material, which is out there, we need to link it up better. We've talked about one-size-fits-all and it's never like that. How can you use this material to your advantage? So it's a bit of a balance, yes, we've got relationships because you talk to your peers about the best way to do things, we do have some support structures such as our delivery assurance people are supposed to be there to help us with the materials and the processes we are supposed to use, so it's not bad but it could be better and certainly, lessons learned are not stored in any consistent fashion.</i>
HC1-PC1-SC1-X1	<i>I think regular meetings, one-to-one meetings with project staff across the piece because like I said earlier about people speaking up in front of others, people are a lot more frank and open and honest about their experiences, how they are feeling about the job they are doing and where it's taking them and how successful they are going to be and particular gripes they've got with individuals possibly. I think they are more likely to come forward with it in one-to-one meetings, therefore it makes it a lot easier as a manager.</i>
HC1-PC1-X1	<i>You could say, possibly, that incremental changes is more around staff and staff wastage, because you've built up some knowledge, you've got staff and they disappear... From a business or technical approach, again, because of other projects, we've had people who are not necessarily experienced, they are having to learn as they go along. So whereas you think, that sounds easy to do a back-up, when you get to do that back up they go, 'Well I've read the books now. And it's not as straight forward as we thought.' So again, you've got those changes, a bit of building of the knowledge, and then hopefully when you come out the other end, you try and write a document that says, 'Well, here are the pitfalls we fell into'.</i>
HC1-PC1-X	<i>Most of the people on the team... understood the [Bank 1] side of it more than the [Bank 2] side, so when we were building the platform for [Bank 2], the knowledge that came to the table was very heavily [Bank 1] focused. So there were some assumptions that [Bank 2]</i>



	<i>cheques, credits, items would go down a certain path or have certain characteristics and the system was kind of built to do that. And although we did go to the people with the knowledge on the current [Bank 2] side of things, some things were missed and actually an [Bank 2] item can never process that way, it has to always process in a different way. So that would be something that would be not originally known and then we need to kind of discover and change. I always felt we should have got the current operational team more heavily involved. The trouble was, we ended up with a system spec that's 300 pages long and for anyone to review is actually not very easy, and we should have probably done more workshop-type review of it.</i>
HC1-PC-SC1	<i>My style is perhaps more laid back, which probably frustrates management style that is very formal. It depends what the changes are. If I can get away with keeping everybody happy that's great. If you get to the bigger contractual changes, your staff needs to change slightly and typically the programme manager on this account at the moment is much more focussed on that, so if I can deal with it I will deal with it. If it becomes more like, this could be contractual, could upset a few people, I'll go to the programme manager and say, 'Guess what...'</i>
HC1-PC-X	<i>Why do twelve steps when you don't need to, if you can just do one, four, seven then nine, why not just do that? So the process has got to encompass all eventualities, but it's got to be flexible enough and not rigid enough to make sure everybody doesn't do them all when they don't need to do them all. They're sitting down doing this thinking 'Why on earth am I doing this? Don't give me this, it's the same as the last two I've written' - then why are you doing it? We've already got two in existence!</i>
HC1-SC1	<i>We have a clear view of what the end game is, we know what the underlying key risks are to the programme but even within areas that I am leading on, I would say the detailed specialist knowledge, on some occasions I don't have that, I rely on the experts within the tasks. But again, I try to have regular meetings with all the managers that lead those areas, to make sure that any key issues or progress I have a good handle on.</i>
HC1-SC	<i>He's now running a major program for [client], very high cost, very high value in a big team of advanced project managers behind him in five years and it's hard to quantify why but he just has this ability to communicate, to get on with people, to motivate people, that's why I think it's more leadership, now you've mentioned it I think management is probably the wrong word.</i>
HC1- PC1-SC	<i>I get lots of phone calls and emails because people tend to know that I'm quite interested in methodologies and process, so I get questions from people I don't know... For example someone came to me for [project] 'health checks', it's only because I quite enjoy doing them and that sense of achievement helping people develop and grow but then by association you come as the expert on doing those... people know that if they come to me I should be able to help you out, but there's nothing written down anyway to say that it's me.</i>
HC1-X1	<i>It's for those who supposedly are experts in some areas of software development. There's a tendency to say, I don't know, I can't tell you how long it will take, it depends if the first driver we download from the internet works or not. And there doesn't seem to be any means of</i>

	<i>saying, 'Well can you assess how many drivers there are?' People don't want to take that approach for thinking about the job before they start actually crashing away at things.</i>
HC2-PC-X	<i>They'll probably say we want this service, but you then translate that into - ok you want this software running on this server, so there is that overall translation I think, for instance they may say they want to improve productivity, there may be an increase in your network because your bandwidth increases and not waiting so long and that type of thing, so more and more often projects aren't so much definite in what they're asking, they're quite vague, you then have to translate that into a deliverable.</i>
HC2-SC1	<i>I kind of come to the table and what am I actually offering? I don't understand the system, I am unable to work the system, to understand what it needs to make it work, the infrastructure, the machinery. There are so many things you have to rely on all the people in your team to understand and to make sure things happen correctly for your project to succeed and I think it when the chips are down and you need to call in favours... I've basically called in an awful lot of favours and I think it's because I can build good relationships with people in the team that when you ring them up a 7 at night and say, I really need this for the morning, could you look at it tonight? People will say, yes, and if you are unable to build good relationships with people I think your project would be way less successful because they wouldn't be prepared to go that extra mile, which unfortunately is usually required.</i>
HC2-SC2	<i>The programme manager that sits opposite me, [name], is running a major [client] programme... so he's talking to all the different accounts that have got hardware in there, so he's got to have a fairly wide diverse contact, people contacts, and he's got to be able to go in on that first meeting and pull that relationship straight away, so I think you have to be able to develop those relationships.</i>
HC2-PC2-SC2-X2	<i>I think education is important in terms of the end users of the processes and tools you are putting in place, getting them involved in the development and the ideas phase, so that they embrace it from the beginning, they are part of it, it's not being done to them, it's being done with them. And feel that they are being heard in terms of the issues they've got with the way we currently do things. Being given the opportunity to express what those issues are and show them how the new piece is going to answer a lot of those problems and remove a lot of those issues they've had and show that their views are valued and taken into consideration and maybe are even part of the driver for bringing in the change.</i>
HC2-X2	<i>I think you only get that if you change your environment on a regular basis because you've got to adapt, if you stay in the one environment of one account or the one customer, you're not going to evolve I don't think, the only way you'll do that is moving around, doing different things, that'll give you that learning instinct thing at the end of the day.</i>
HC-PC1-SC	<i>It's management style... [staff] didn't have the confidence to stand up in the meeting and say it because they would have got shouted down. Which meant those meetings were pointless by the end... I don't want to be critical of her because she delivered the project on time, to budget, good quality, she had a good relationship with the client and she's now gone on to bigger and better things, so she did the job the corporation wanted of her. But she is very much a 'my way or the highway' type of person and I think that came out in lessons learned.</i>

	<i>So as a general point, any lessons-learned process has to allow for the capturing of information that people don't want to share publicly.</i>
HC-PC	<i>I think you need to know the mechanics for it to be organic effectively, you need to have done your apprenticeship effectively to know how to do it properly, like a proper car mechanic, they have their apprenticeships, then they use that knowledge built up over time to adapt to different circumstances, I struggle with people that have done project management for a year, two years, call themselves a project manager and go off contracting, earn lots of money, I've interviewed a few, I'm the best thing since sliced bread, no or I've done a certification, I'm now a project manager - no you're not, I'll take someone who's got the experience over someone that's got the certification every time.</i>
HC-PC-SC-X	<i>We start off the project by creating a project schedule which is based on the standard process and it's a process that I'm comfortable with... but you can start off with a very waterfall project and on Day 1 something's going to slip and all of a sudden you are overlapping 2 tasks and that's not necessarily the model, but that's life. And in that sense, I try to be as flexible as possible with it... Day 1 I was given an implementation strategy. Day 2 I challenged it and we came up with something different. And I think, well, such is my right, I've been given this, let's get everyone together, what do we think? And we changed it and for 2 years that's been a very stable implementation strategy that we've been working to... Something has happened to make me have to rethink that and I've got the team together and we've come up with another great idea.</i>
HC-PC-X	<i>I was given the set requirement to deliver and I did it ahead of time because as a result of giving people flexibility, rather than thinking, I've taken that as far as I can do it, what's next on the list? And everything was moving along and if one thing changed to amber because they couldn't get so-and-so to respond to an email, then they would go and work on something else rather than sit around waiting for Task A to finish. And it worked.</i>
HC-SC1	<i>A project manager is almost like a facilitator and an integrator as well, and you may not know but you have to bring the right people in together to have the brainstorming session to understand how you might solve the problem and it might not be people on your project. And there's a network of project managers effectively under the programme manager and to be honest between us we would borrow each other's people and so on. I guess as you work on an account you get to know the different skill sets of the developers and the different people as well which is helpful.</i>
HC-SC1-X2	<i>But I think it's down to the openness and the ability of the manager to take input from the team... it has a knock-on effect on the whole team I think because you could improve the project, but people feel they can speak and be open... I think if you're in a very regimented environment you may not feel you can do that, it's very hierarchical, regimented, you're not allowed to say certain things or step out of line, I don't mind what people say, if they say I'm not involved, fine have a good laugh and move on, if it solves a morale problem fine, I don't mind being in a butt of a joke to solve a problem, so I think it's got to be open.</i>
HC-SC	<i>Every time I do a project, every day I probably learn something different, or think I could have done that slightly differently and I think</i>

	<i>my approach to project management is much more about speaking to people and I think that is key. There is no way I could deliver this project by myself. I'm technically not that competent but also there is too much work to do. And so, my role as a project manager is to draw on the skills of different people and that's where I think that experience helps.</i>
HC-SC-X	<i>I think it's very important and I also think you have to be adaptive, you have to adapt the relationship and stance that you have with each individual and that probably has to change on a daily basis as well, yes you have your meetings with everybody but on your one-to-ones etc. you try and get a feel for that person, how to motivate them, how to drive them, it's all down to those interpersonal skills as it were which I think is very important, people aren't going to work for you if they think you're a horrible person, or they're not going to get on with you, you try and find out what makes them tick and you use a lot of those communication tools via the pc... you've got to be able to talk at all levels to all people.</i>
HC-X	<i>When I came back into this role from a previous role within [another] account, there were several areas where I tried to repeat what I had done previously and quickly found out that wasn't going to work. So the experience I had there was valuable, but could have led me entirely down the wrong path if I didn't have the attitude of OK, let's look at this as a separate problem, apply the pieces from that previous experience that work in this case, but don't blindly follow everything that worked last time.</i>
PC1-SC1	<i>I guess typically I would be working with a team that were not all based on the same site so we would have a least a weekly team meeting which would be a dial in conference-call type thing and I would try and get people from each of the different areas... Because the development of the software was only a portion of the project, it didn't really make sense for them to come to all the project team meetings so I had separate meetings with the vendor, again just conference calls because they were remote.</i>
PC1-SC1-X1	<i>We were asking them to assess the system that effectively the supplier had never tested. We are unit-testing for them, so they are full steam ahead with system testing but we are finding faults that our unit-testing would have thrown up, so morale was very low and being remote I would go up there once every two weeks or three weeks, it clearly wasn't working, so I insisted on a daily call with the testing just to get them back on track and that worked really well. Now actually, that's fallen away slightly and I think it's because the need has fallen away.</i>
PC1-SC2	<i>On the mainframe project after we'd wrapped it up I must admit I had a few phone calls from other project managers doing similar work that involved [Company], the Indian team, and they were phoning up, 'How did it work', etc. So these people phoned out of the blue and I was able to share certain documents, obviously some are confidential, but some I could share with them and go, 'There you are, there's a plan we put together', that sort of thing.</i>
PC1-SC	<i>If I know somebody, I try to be as informal as it makes sense to be informal, I possibly rely on email quite a lot when I could pick up the phone and move things a bit quicker but sometimes I quite like the record of having sent an email, whereas if I speak to somebody and follow up with a mail it always looks a bit odd, as if I'm checking up on</i>

	<i>them. You either trust them to do it or you don't.</i>
PC1-SC-X	<i>So we turned up to meeting with [Bank 1] people who firstly didn't enjoy being taken over by [Bank 2] and secondly even hated us because we were taking some of their jobs and we were a contractor. So it was a very, very difficult period... Anything that would slow the project down, any issue was always portrayed as our issue, our fault. And there was a lot of people involved at the next level up who obviously got a lot of stress, but we delivered. The next project that I did after that people had got used to what was going on and in the bank's defence, they use PRINCE as a methodology and they are very, very much into project management and they always had a business and a technical PM so there was always me and whoever against two of them, we were expected to be technical and business, they had their own silos. But we started to get to know them on a more personal basis as well. And we are now at a stage in my mind where I have to be careful because I almost don't see them as a customer any more. They are part of the team and I think they look at it the same way. We are one big team. So over 10 years, I think it has changed.</i>
PC1-X1	<i>Even small projects, you've got so many changes and you need a good mechanism to manage, otherwise, you kind of – Oh God, what did we actually deliver? And it doesn't always match, we haven't always had time to go back and revisit the documentation but you can kind of take a snapshot in time and say 'Well, it's those requirements plus these 6 change requests'. It's kind of what we are delivering or what we delivered. That's one of the process, probably one I respect, the change management process.</i>
PC1-X2	<i>Yes, rely on your processes and so on which I think from past experience because if you like they are a sort of crutch holding you up and then at some point perhaps you realise they are looking, that's when the innovation comes in and you suddenly realise the scope of your problem and set about fixing it.</i>
PC1-X	<i>I guess as you go through the scope, on my last project, the scope kind of grew. There was actually a very flawed assumption in the original thing we were doing which basically meant we had a whole chunk of extra work that nobody had really outlooked, that was like a financial change... And I guess the ones with the customer are the most formal changes and go through a weekly or fortnightly board with the customer. It's pretty mature, I would say, the change management processes on this account.</i>
PC2-SC2-X2	<i>If you tell people you are going to implement this new system on next Sunday and they tell you, 'Well actually, did you know that there's a power outage at the plant?' Or wherever you're implementing it, they're going to give you their opinion there and then, and I think that we do need to seek out information from the stakeholders earlier. [But]... they don't know what we need to know. Consequently, you might open up with some really generic statement like, 'Do you think there is anything we need to know?' And they probably say, 'No'. It's a bit like asking a kid what they learnt at school. You've got to find some ways in which to open the end users up.</i>
PC2-X2	<i>He will have other project managers working for him to deliver various work streams. I use that term, 'Work Packages', because it's easier to manage it that way; kick off a project, kick off another one. Customers don't seem to be able to understand programme concepts. They want everything up front, and to know everything now, and you can't know</i>

	<i>everything now, we can tell you this first tranche, we can tell you another one in another tranche and hopefully by the third, we'll have everything pretty much down.</i>
PC-SC1-X	<i>The beauty of having a meeting is you spend an hour and try and keep to the hour and everybody gets a view of the other issues and sometimes you get this, 'Well I can sort that one out for you', type of thing, from one team to another. There'd be the representatives of the team, generally. We do once a month on the bigger project have a get-together of the team... Just to communicate things.</i>
PC-SC1-X-Op	<i>We had one project, a fraud project I worked on, the teams just integrated seamlessly. We would go out for drinks together, things like that, and I remember one of the programme type people in the bank asking us, 'Why did the project work so well?' Because other ones weren't. And the easy answer was, well, because we just worked together. And it was give and take. 'I know we said that in the scope, but actually, we want to do this' 'Fine, OK, I can accommodate that', 'I've got nothing in my budget, but what about that?' 'Well actually, that is a complete change', and they would say, 'OK we'll raise a change request then'. And it just worked superbly and it was delivered.</i>
PC-SC	<i>I think on an individual level we try, it works to a point but as you go higher in the account, there's an obvious lessening of trust between the two parties, either because of previous things that have happened, because of other accounts like [name], just things that have happened to those individuals, the trust gets less so you tend to use commercial support a lot more to understand what you can and can't provide, whereas you might be a bit more flexible because we know where we stand with [client] basically and all the past business we've done with them. But it does get quite difficult. I think it's difficult on both sides. It is unusual for [my Company] to be in a situation where they're the subcontractor, so that's just trying to work out how you fit in, but on the [Prime Contractor] side, they've admitted that they've got distrust of [my Company], so there's not a lot you can do there.</i>
PC-SC-X2	<i>We knew what the industry wanted at the end of the day, which was a faster processing of cheques, or pay-cheques particularly... The industry didn't have the answers, the bank didn't have the answers, the project didn't have the answers, so that was an interesting way of say, we all know where the end point is, but let's come up with a solution to it. And we spent many iterations with the bank going through how we thought it could work, etc. etc. Going back to industry, asking - did that fit, and you would get in this lovely situation of everybody would agree, go away, come back to the next meeting and all disagree again... I was lucky on that project because everybody on the team was very, very experienced, so it was more of a learning approach for me to say well OK, as we go along, we get to this point, 'Does everybody agree with the design? Let's move on', or 'No, let's make some changes'.</i>
PC-SC-X	<i>We're... getting the graduate in to do a formal process improvement activity of looking at what are our key outputs, what do we need to do to achieve them, what's the minimum we need to do to achieve those outputs in order to get an efficient output and identifying who the customers of the outputs are, so that, OK that's what we think they want, but just confirming they still want it and they are not adopting the – it will do, but I'd rather have this – type approach....so making sure we are giving all of our internal customers what they want, when they</i>

	<i>want it, how they want it, rather than what we think they want.</i>
PC-X1	<i>I guess from the test cycles, some things you don't realise you don't know, they don't become apparent until you've run a particular test cycle and something you were expecting to happen didn't, and I guess it's gradually building up that fuller picture... It's just all kind of stuff comes out, doesn't it and you go through - I suppose in that way, the structure of the project and the fact that you start to look at your requirements and you dig down and try to understand different areas of the project and information comes to light. But unfortunately, in my experience, it doesn't all come to light in the beginning and typically you would have to raise over the project a number of change requests. Something wouldn't be as you originally thought it was going to be because it's got more information as you go through and that knowledge I guess has come out because of the activities on the project.</i>
PC-X2	<i>Obviously with some projects, therefore they become programmes, they don't really understand what the outcome is, therefore you kick off more exploratory work to understand, or to try and find better the requirement, or even do some solutioning, which is where you go into the iterative process... 'Do you understand what it is you need to do?', and then go back to another investment board for that money.</i>
PC-X	<i>You need to be flexible. I'm not saying I'm right, you need to follow some processes on one scale, and on another, you need to be very focused on what you are delivering to the customer and making sure. So I think they fall to some sort of terminology, healthy cynicism of something like that... you should be challenging it all the time.</i>
SC1-X1	<i>I think it's important because you need good communication, otherwise the project will just fail. I've seen before, the left hand doesn't know what the right hand's doing because we're not communicating, we're not passing on knowledge, we're not passing on information and I think it's very important otherwise the projects are not successful.</i>
SC2-PC1-X	<i>The processes and procedures need to be there... It changes all the time... It's quicksand, all the time, isn't it? I've just gone through, for the [name] programme, we've got budget, we've everything signed off, nearly, with [senior manager], he's all for it. He's moved on, and the new man's come in and he's questioning 'Have you really got it?' 'Well, yeah, because your boss is the one that signed it off!' But he's in a different role now, so we're back to square one!</i>
SC-Op	<i>Morale is probably a good indicator, if the project team hate each other, it probably didn't go too well. If they're all right we might work together again, it was good stuff, everyone's happy, then I think that's a good indicator... Yes and I think you can probably get that positive morale I think even in projects that have been delayed or failed as well, it's not necessarily because it's failed, it's so negative because they are still pulling and routing for each other and taking that forward but we don't tend to measure or quantify that feeling of morale or customer satisfaction too much.</i>
SC2-X2	<i>And it changes constantly, we've just had [Name1], who was in charge, he was a CEO for [Programme], he's moved up to [serve the client] now, because [Name2]'s moved on, [Name3]'s moved up, [Name4] has moved on, they've moved on – everybody - it's like a constant jigsaw puzzle, who is doing what?</i>
X1-Op	<i>A massive factor on special projects and I always wonder when we</i>

	<i>get these stats about 70% of projects fail, on time, on budget to quality, measures, I think that is because we measure that success against the original baseline, even if there was a baseline, and that very few projects manage the baseline well to be able to such an extent to say, OK, we didn't hit these because we had so many changes, but we managed the changes within the scope that we did, and therefore we hit it.</i>
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#### 4.6.3 Understanding the Interactions

The evidence of Table 23 shows that there are many inter-linkages between the constructs in the research model that can be considered in understanding the *how* of project operation and ambidexterity. This provides further evidence for the Sub-RQs:

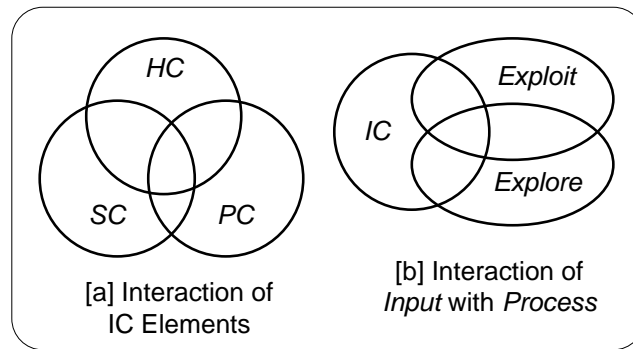
***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

This provides a different approach to the subject, since the literature to date has conceptualised ambidexterity primarily at the group- or firm-level where the human, social and organisational capital can be understood as (broadly) separate, although co-existing, constructs (Kang and Snell, 2009; Subramaniam and Youndt, 2005; Youndt et al., 2004). Clearly they are inter-related, since it is individuals that are connected socially and formally, and organisational functions can be considered in terms of social mechanisms (e.g. Kogut and Zander, 1996) such that learning may be considered at the organisational level (Crossan et al., 1999). Indeed, March (1991) identifies the mutual learning of an organisation and the individuals within it, and a quantitative investigation by Reed et al. (2006) investigates IC-interactions in the banking industry. However, whilst it is beneficial to consider intellectual capital in terms of its subcomponents to better understand the mechanisms (e.g. Nahapiet and Ghoshal, 1998; Swart, 2006), their interaction at the individual level is not a well-understood phenomenon.

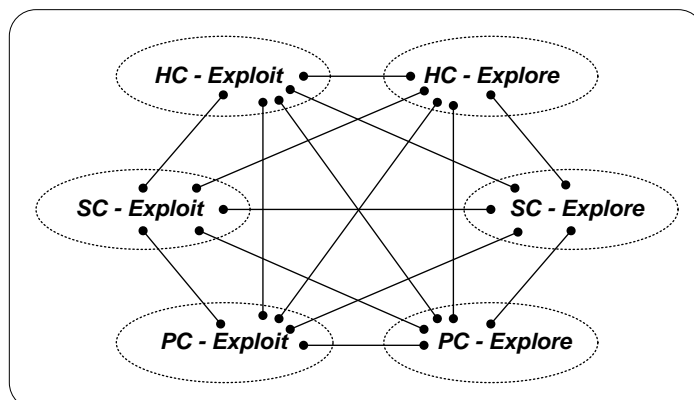
With regard to ambidexterity, at the individual level we would therefore expect a form of contextual ambidexterity. Gibson and Birkinshaw (2004:209) define this as “the behavioural capacity to simultaneously demonstrate alignment and adaptability *across an entire business unit*” (emphasis added). Assessing at the level of the individual manager together with ambidextrous processes shows that the consideration of the constructs as separate, as was the case with the research model development, does not account for the rich interaction in practice. This is indicated in Figure 59, where [a] highlights the interaction of the input elements, and [b] shows the interaction of *input* with *process*. This is intended as a simple pictorial representation of the interactions that were demonstrated through the interview evidence.





**Figure 59: Interaction of Constructs**

However, the operation of these constructs is far from straightforward, as highlighted in Table 22 and Table 23. This is represented further in Figure 60, which shows that, within Table 22, there are links from each IC element to every other (indeed, there are four instances of HC-SC-PC-X, linking all the elements). So although the argument in section 4.3 shows that all 6 intellectual capital elements can be identified in the activities of managers, this also shows that none exist in isolation, and each is connected (in some way) to other elements to achieve some aspect of the work. When analysing work execution, we must therefore consider not just the existence and contribution of each element, but also its operation within a configuration of the other elements.



**Figure 60: Interconnections of IC Elements**

This is a somewhat abstract theorisation, and this argument is perhaps hard to relate to practice. What does this mean in terms of a practical project management scenario? As discussed in section 4.3.2.3, the case of one manager with a poorly-performing project showed that the lack of working social relationships was severely limiting any flexibility. Again:

*“These relationships are gone, are burnt, and the people are tired, so what’s happening is that the process is driving things.”*

Relying on procedures was not working particularly well within the consortium under these conditions:

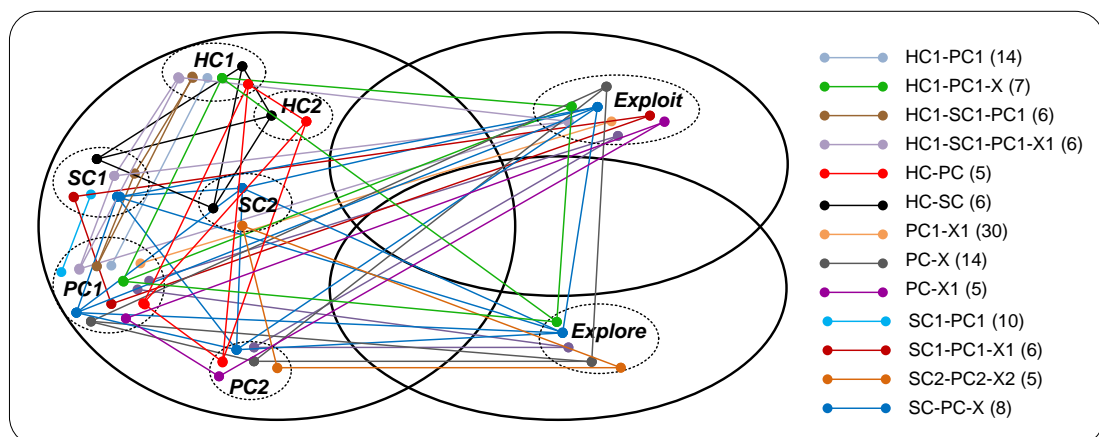
*“Yeah, I think there should be more flexibility, to a degree – I think people are nearly slaves to the process – but they have fear, because there’s no trust, that’s the only thing to lean on when I follow the process. If you deviate from the process you’ll get beaten up. That’s basically the bottom line. So, yes, I’d like more flexibility, but I can’t even deviate from the processes or I’ll*

*get beaten up. I don't think that's right because personally I believe the process is there to help deliver, not hinder. We should be able to use it as a guideline and be clever enough to use it effectively but deliver as well. What we're doing in fact is being slaves to the process but not delivering. That's why it's late."*

So here, exploitation (in the sense of process-following, rather than evolution) was occurring with minimal problem-solving or exploration, resulting in significant project slippage. The poor social relationships meant that neither the team HC nor the PC were being utilised effectively, resulting in ineffective exploitation and exploration, and corresponding poor performance. The interviews were not originally intended to bring out such information, but subsequent analysis of the transcript showed how this interpretation could be developed from the data.

This reinforces the idea that successful ambidextrous operation requires both exploitative and exploratory HC, SC and PC, and that a deficiency in one area may hinder the effective utilisation of another. The further question is to investigate how these interaction mechanisms can appropriately be understood and applied to the management of projects.

Figure 61 shows the interconnections represented by the parallel coding of Table 22 with five or more references in a visual format. As can be seen, this is a complicated diagram, showing the difficulty of comprehending the operational mechanisms identified. This is not intended to be the basis of any quantitative analysis, merely as a representation of the different coding forms showing the most prevalent separate interlinking mechanisms. The nature of the parallel coding scheme means that this is possible. Further detail could be added in terms of line thickness corresponding to the number of references in Nvivo, but this method simply shows the practical complexity within the task of trying to comprehend ambidexterity.



**Figure 61: Representation of Linkages with 5 or More References**

This idea builds on the model of Figure 60, in that we can appreciate not only that the 'six-box' IC solution is required, and that interaction between the elements is an enabler of ambidexterity, but that these need to be orchestrated to manage project execution. This is empirical evidence that builds upon the work of March (1991) and Kang and Snell (2009).

The unit of analysis is important here. This is identified as the manager within the project, and therefore it is the manager's HC and SC together with the PC that is of interest. However, as with the elements themselves, these are only relevant

concepts in the presence of the project and the other project actors (SC, by definition, is only meaningful in the context of multiple participants). We can conceptualise the managerial role, then, as also involving the configuration and management of these input and process elements according to the requirements of the project goals. This is not suitable for a 'one-size-fits-all' approach, but must be tailored to the project, and also depends upon the individual manager.

## 4.7 Summary and Discussion

This research phase has addressed the Sub-RQs:

***Sub-RQ1: 'How are the different forms of Intellectual Capital used as inputs?'***

***Sub-RQ2: 'How do exploitation and exploration occur at the level of the project?'***

This tested the theory that all six IC elements (HC, SC, PC in exploitative and exploratory forms) could be identified in the role of the project manager. The evidence from 16 managers showed that all six aspects could indeed be identified, and this is a step forward in the theory of ambidexterity. From these interviews, human capital can be identified as both *specialist* (this can include project management expertise as well as technical specialisation) and *generalist* (a range of previous experience that is brought to the work). For social capital, a range of network ties were deemed valuable in the opinion of the respondents (as both *cooperative* and *entrepreneurial* SC), and the key role of knowledge integrator was highlighted. For project capital, a robust process structure was valuable, together with the flexibility to respond to events at the task level.

There is no 'one best way' for managers to operate, and from the responses, two forms of managerial 'operating mode' could be identified. Firstly, there was a tendency to operate with a tendency towards either a social or a process-based style. 'Getting things done' could be accomplished more by social interaction, or by more coordinated formality. As one respondent commented:

*"I must say I prefer a more informal [approach], different projects need different approaches. I have a more informal approach, it seems to work for me. Other people are much more strict and regimented and that works for them. So it's getting that balance of people across a programme."*

Secondly, it was also acknowledged that individuals can also exhibit a tendency to prefer a more exploitative 'follow-the-rules' approach, or an inclination towards more innovation and flexibility, with a greater willingness to try new things:

*"I think within our organisation, there's a whole spectrum of people. So there's people to the right of me who are, much less process oriented and almost ignore the process and so there's people who just follow the process letter for letter, and do nothing else. There's a whole spectrum of people in between."*

However, more was gained from the data. In terms of exploitation and exploration, coding of these constructs was challenging, and showed the difficulty of applying the ideas in a qualitative context. Consideration of their nature supports the ideas of Farjoun (2010) in that they can be considered as a *duality* rather than a *dualism*.

Disentangling exploitation and exploration was complicated, highlighting that trying to explain their occurrence at the project level is not a straightforward task. Although examples were identified in the coding, they were inextricably linked to the IC inputs. Parallel-coding of the interview data showed that the interactions of the intellectual capital inputs and the processes of exploitation and exploration were complicated, and that they were interwoven in a multitude of ways. No 'simple' model or explanation could be generated, and the findings were valuable because they indicated how intricately they were interconnected. These findings address Sub-RQs 1 and 2, in that the nature of managerial ambidexterity has been qualitatively unpacked to reveal the elaborate interactions between the intellectual capital resources and the processes of exploitation and exploration.

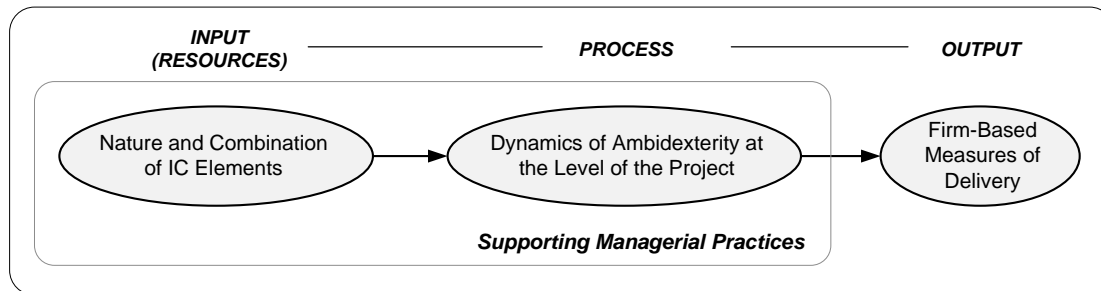
The next stage of the research was to further address the primary research question with Sub-RQ3 and build on these findings via multiple case studies.

***RQ: 'How is ambidexterity achieved at the level of the project?'***

***Sub-RQ3: 'What management practices support the orchestration of ambidexterity?'***

## 5. CHAPTER 5 – PHASE 2 RESEARCH FINDINGS

The research model and the initial Phase 1 individual manager interviews used the *input-process-output* model to theorise ambidexterity in the context of the management of projects, and this approach is continued. Analysis of the interviews showed that project operations could be understood in terms of ambidexterity, and that this could be explained further by considering the interactions between the constructs within the research model (repeated as Figure 62).



**Figure 62: Research Model**

In the first phase of the research I investigated whether all six elements within the intellectual capital model (human, social and project capital, each in exploitative and exploratory form) were evident. The data showed that they were indeed identifiable, but that they were significantly interwoven. Additionally, these inputs were also intertwined with the process elements (exploitation and exploration) and that exploitation and exploration could be hard to distinguish when faced with practical project operations. This supports Farjoun's (2010) idea of considering them as a *duality* rather than a *dualism*.

The coding uncovered a multitude of interactions between input (intellectual capital) and process (exploitation and exploration), revealing the intricate nature of this enactment, and highlighting the difficulty in fully understanding the *how* of ambidexterity. However, this could not fully explain the orchestration of ambidexterity at the project level, and so case studies were chosen to investigate this further. As discussed in the research plan, the use of case studies with multiple respondents, supported by project data, allows a more fine-grained analysis of the managerial practices that lead to project ambidexterity. By qualitatively examining projects over their lifecycle, a greater understanding of the *'how'* of managing ambidexterity may be generated in a complicated organisational environment, the area highlighted as under-researched from the literature review.

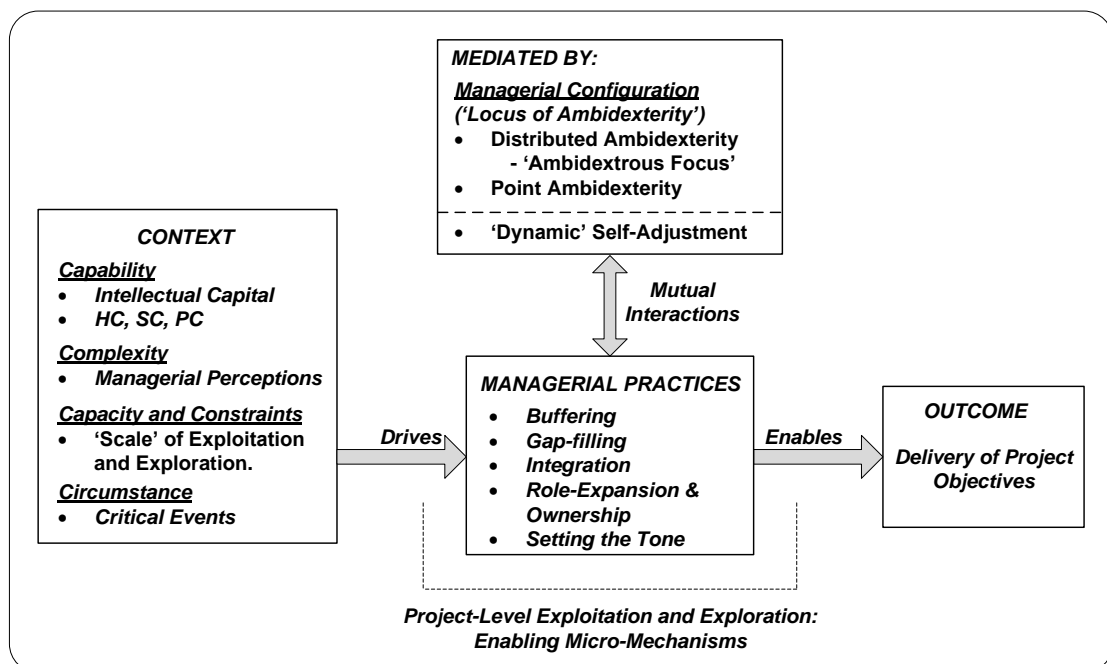
Due to the heterogeneity of project operations, multiple cases were selected to allow ambidexterity to be examined in a range of contexts (although all within the field of IT-services), and this is discussed in detail below. This is in line with the method discussed in the research plan, described in detail in Chapter 3.

**RQ: 'How is ambidexterity achieved at the level of the project?'**

**Sub-RQ3: 'What management practices support the orchestration of ambidexterity?'**

## 5.1 Overview of the Purpose and the Findings

This chapter uses eight case studies to further develop the understanding of the managerial practices that enable project-level exploitation and exploration. This is in line with other research that used case studies to investigate ambidexterity, such as Andriopoulos and Lewis (2010), Lee et al. (2006), Matson and Prusak (2003) and Taylor and Helfat (2009). Here I achieved this by using multiple managerial responses per project (3, 4 or 5 individuals). The range of respondents (including project managers, PMO managers, technical managers, service managers and programme managers) allowed different perspectives and practices to be analysed. The model derived from the case evidence is presented below (Figure 63). This chapter presents summaries of the cases along with the rationale and qualitative analysis detail through which it was developed. The chapter is used to build and explain the full model, and it is presented again finally as Figure 68.



**Figure 63: Model Developed from the Case Studies**

## 5.2 Protocol and Analysis Development

An interview protocol was developed for use in each case, and this was used consistently and without alteration as the research progressed. The plan was to initially introduce the nature of the study and briefly explain the concepts under investigation (the ideas of organisational knowledge being located in people, relationships and processes, and the concepts of knowledge refinement and knowledge creation). The interview protocol used (including the introductory diagrams to explain the purpose) is given in Appendix C.

As detailed in the research plan, the questions would cover three main elements:

- 1) The 'story' of the project and the individual's role in it.
- 2) Discussion of any 'critical incidents' and the actions undertaken at the(se) time(s).
- 3) How this differed from the 'intervening' periods between critical incidents.

This would be used to examine both the nature of ambidexterity (what exploitative and exploratory activities are undertaken as the project unfolds) and what practices are used by the managers to enable these to occur.

A semi-structured approach was adopted, to gain the benefit of a simple predefined protocol whilst accommodating the flexibility to discuss any emergent issues, including critical incidents. The use of the critical incident technique was to attempt to examine the balance of exploitation and exploration over the project, with particular focus on if/how this changed at times of difficulty and what (if any) changes in managerial practice occurred to achieve this.

The intention was to look for themes of intellectual capital (HC, SC, PC) as well as exploitation and exploration, and, by using multiple respondents, understand the interaction at the project level also. The objective was to try and identify specific practices or behaviours that could explain how ambidexterity is enabled at the project level.

Specific issues to identify regarding ambidexterity were also developed by reviewing previous protocols published in the literature, and bringing out key themes identified in the first phase of the research. At the time of developing the protocol (late 2010), a total of 21 survey instruments had been published in the ambidexterity literature, and these were all collated and reviewed to see if pertinent questions and ideas could be incorporated into this study. Other key papers using survey instruments were also reviewed. This was especially important in terms of previously-used questions for exploitation and exploration, as (as described in the previous chapter) disentangling them proved difficult, and to draw upon established criteria gave further validity to the classification.

They were grouped into a relatively small number of themes to use as areas to consider as part of the interviews. They were for use within the interview to try and ensure that important areas had not been overlooked, but were not specifically part of the interview protocol, which was intended to be more exploratory in nature. These would also be the initial basis of the subsequent a priori coding scheme.

The concepts are shown in Table 24, including the references from which they were derived ('I/Vs' indicated themes identified within the Phase 1 research interviews, including the exploratory interviews before the 16 formal discussions). Note that the phrasing has been tailored to the context of IT project-management ('...business experience that is useful to bring to this project', '...ties with the key members of the project team', 'Tailoring procedures to suit the requirements of this particular project' and so forth).

**Table 24: Themes from Initial Interviews and Previous Literature**  
**Individual (HC)**

<i>[General Experience]</i> General business experience that is useful to bring to this project.	Kang (2006) + I/Vs
<i>[Overview]</i> Good overview of what's going on within the project and what others are doing.	Kang (2006); Tiwana (2008) +I/Vs
<i>[Process Experience]</i> Experience of using, and knowing how to get the best out of, organisational processes.	I/Vs
<i>[Specialist]</i> Have and use specialist knowledge and skills in the performance of the managerial job	Kang (2006) + I/Vs

**Social (SC)**

<i>[(In)formal Communications]</i> Formal / informal nature of communication.	I/Vs
<i>[Co-location]</i> Co-location.	I/Vs
<i>[Easy to talk]</i> Easy to talk with virtually anyone, regardless of position.	Ahn et al. (2006); Jansen et al. (2006) + I/Vs
<i>[Relationships and Ties]</i> Interaction and relationships / ties with the key members of the project team, other stakeholders and other wider contacts.	Ahn et al. (2006); Hughes et al. (2008), Kang (2006); I/Vs
<i>[Trust]</i> Development and use of trust.	Tiwana (2008) +I/Vs

**Project Processes (PC)**

<i>[Flexible Systems]</i> Systems and processes are flexible enough to accommodate practical difficulties or opportunities within project.	Im and Rai (2008); Ketkar and Sett (2009) + I/Vs
<i>[Judgement]</i> Judgement can be used, experimentation, challenge existing practices to produce better results.	Gibson and Birkinshaw (2004); Im and Rai (2008); Ketkar and Sett (2009); Morgan and Berthon (2008); Nemanich and Vera (2009) + I/Vs
<i>[Lessons-learned]</i> 'Lessons-learned' from this project and other projects to improve performance	Bontis et al. (2002); Hughes et al. (2008); Jansen et al. (2009); Nemanich and Vera (2009); Tiwana (2008) +I/Vs
<i>[Standard Procedures]</i> Standardised processes, procedures and rules about how to execute work in this project; review and audit process to ensure that procedures are followed	Kang (2006); Jansen et al. (2006) + I/Vs
<i>[Tailoring]</i> Tailoring procedures to suit the requirements of this particular project	Im and Rai (2008) +I/Vs

**Exploitation**

<i>[Change Control]</i> Sufficient change-control capability to effectively update and track changing project requirements.	Tiwana (2008) + I/Vs
<i>[Client Feedback]</i> Regular feedback from the client so that issues can be rectified promptly.	Cegarra-Navarro and Dewhurst (2007); Hughes et al. (2008); Li et al. (2008); Lubatkin et al. (2006); Menguc and Auh (2008); Morgan and Berthon (2008) + I/Vs
<i>[Knowledge and Sharing]</i> Sufficient knowledge and knowledge-sharing to overcome the issues faced in the project	Jansen et al. (2009); Lee and MacMillan (2008); Tiwana (2008) + I/Vs
<i>[Learning from Experience]</i> Over the project, learning from experience and revision / enhancement of the way of working.	Jansen et al. (2006); Morgan and Berthon (2008); Nemanich and Vera (2009) + I/Vs
<i>[Objectives and Client]</i> Project objectives agreed and documented with the client so that both parties are clear on the project requirements.	Cegarra-Navarro and Dewhurst (2007); Hughes et al. (2008); Ketkar and Sett



	(2009); Li et al. (2008); Morgan and Berthon (2008) + I/Vs
<i>[Robust Processes]</i> The project processes have been robust, efficient, and appropriate for the work.	Bontis et al. (2002); Im and Rai (2008); Kang (2006) + I/Vs

### Exploration

<i>[Develop Relationships]</i> Develop relationships across a variety of internal and/or client functions.	Kang (2006) + I/Vs
<i>[Innovation and Flexibility]</i> Innovative, flexible approaches to solving project issues.	Ketkar and Sett (2009); Nemanich and Vera (2009); Sethi and Sethi (2009) + I/Vs
<i>[Long-Term Client Benefit]</i> Delivery of long-term benefit to the client, beyond just the project implementation.	Li et al. (2008) + I/Vs
<i>[New Ways to Satisfy Client]</i> Look for new and creative ways to satisfy the needs of the client and take action as necessary.	Crossan et al. (1999); Lubatkin et al. (2006) + I/Vs
<i>[Plan to Accommodate Problems]</i> Plan the project work and accept that problems will have to be solved as part of it.	I/Vs
<i>[Process Flexibility]</i> Processes flexible enough to allow quick responses to changes encountered when trying to meet the project objectives.	Gibson and Birkinshaw (2004); Im and Rai (2008); Ketkar and Sett (2009) + I/Vs

### Outcome

[a] Critical Incident – pattern of performance / earned value tracking. [b] Project

<i>[Performance and Satisfaction]</i> Successful performance in terms of requirements met, client and staff satisfaction.	Gibson and Birkinshaw (2004); Tiwana (2008) + I/Vs
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In order to validate the use of these concepts, the first 16 interviews were also reviewed again to correlate the ideas with the evidence from the discussions. The results are shown in Table 25, highlighting the traceability back to the original interviews. The ticks indicate that the particular theme was identified in the transcript. Note that, as described in the previous chapter, managers 9 and 10 were interviewed together.

Table 25: Elements from First Phase Analysis

Element ↓	Interview →															
	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	
Human Capital (HC)																
General Experience	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Overview	✓		✓	✓	✓	✓				✓	✓		✓			
Process Experience		✓	✓			✓		✓				✓	✓			
Specialist	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Social Capital (SC)																
(In)formal Communications	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Co-location				✓					✓	✓	✓			✓		
Easy to Talk	✓	✓		✓	✓				✓					✓		
Relationships and Ties	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Trust	✓	✓	✓		✓	✓	✓	✓	✓			✓		✓		
Project Capital (PC)																
Flexible Systems	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Judgement	✓	✓					✓		✓		✓	✓	✓			
Lessons-Learned	✓	✓	✓		✓	✓	✓	✓		✓	✓				✓	
Standard Procedures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Tailoring	✓	✓	✓			✓	✓		✓	✓	✓	✓				
Exploitation																
Change Control			✓	✓	✓		✓			✓	✓	✓	✓			
Client Feedback		✓	✓	✓				✓	✓	✓			✓			
Knowledge and Sharing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Learning from Experience	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Objectives and Client		✓	✓	✓	✓				✓	✓			✓		✓	
Robust Processes		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Exploration																
Develop Relationships	✓	✓	✓	✓	✓		✓		✓			✓	✓	✓		
Innovation and Flexibility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Long-Term Client Benefit	✓		✓						✓	✓		✓			✓	
New Ways to Satisfy Client			✓	✓	✓			✓	✓	✓			✓		✓	
Plan to Accommodate Problems		✓	✓			✓				✓		✓	✓	✓		
Process Flexibility	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Outcome																
Performance and Satisfaction	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	

### 5.3 Summary of Cases

A brief summary of each case is now provided, to give an overview and highlight the key points of each. Further supporting performance data and details of each respondent are given in Appendix D.

Each case also contains a comparison of the participants in terms of their *inputs* (IC elements), *process* (exploitative / exploratory practices) and *output* (the main focus

of their work). This is in line with the presentation of within-case data (Miles and Huberman, 1994:90-142).

Respondent's names are not given, and each is referred to by a code: R1, R2, R3 etc., so that their relationships can be discussed with regard to each case. Note that some of the comments (such as role expansion) refer to the findings from the cases that are subsequently discussed in detail.

### 5.3.1 Case 1 – Finance Industry (Credit Cards)

Case 1 was in the UK finance industry, and concerns the development and support of an IT system to record telephone conversations between credit card customers and the bank which are required by the UK regulatory authority to be retained for 7 years. It was around 3 years old at the time of the case, and the project as reported was in the 'support' phase'. The Company were the prime contractor for UK support, and worked with other vendors, though mainly a smaller foreign subcontractor to provide the key functional elements. Ongoing technical upgrades were managed as small projects within this work and were generally smooth, although at the end of the year (just before the interviews), the client failed to renew the contract with the Company and instead went directly to the contractor. This caused the project to be terminated abruptly.

Three interviews were undertaken, the Applications Delivery Manager / Project Manager (R1), the Service Delivery Manager / Technical Lead (R2) and the PMO Manager (R3). These individuals were not co-located, and met only sporadically.

The case was selected as the financial performance data appeared to be perfect, with no indications of any deviation from plan. The roles of the three individuals were quite distinct. The PM role was only part-time, as he also managed other projects as well. His primary focus was on overseeing the work and relationship management, and in terms of critical incidents his concern was the recent loss of the contract, over which he had little control. The Technical Lead oversaw all the technical issues with the IT and the upgrade projects, and technical liaison with the customer and subcontractor. His critical incident focus was on a time when the system lost some of the recorded calls, and coordinating the response. Interestingly, this was not mentioned by R1. The PMO Manager was primarily focused on reporting data and adherence to the Company processes, and covered multiple projects. Since this piece of work went relatively well (until the end) he had little need to become involved in the details.

**Table 26: Summary of Roles in Case 1**

Individual	Input	Process	Output
R1	Mainly generalist HC, cooperative and entrepreneurial SC, mechanistic and organic PC.	Exploitation (mainly focusing on delivery and managing relationships) and exploration in cultivating new relationships. Role expansion at the CI (contract renewal) although to minimal effect. More 'outward'-focused, less involved in the technical detail.	Focus mainly on communicating upward and outward, and on performance metrics.
R2	Specialist tech and generalist HC. Built strong SC, mainly	Mainly exploitative at the technical level, though using previous experience in	Focus on technical performance

	focused on the delivery aspect. Process focus with flexible problem-solving.	solving new problems. Role expansion in technical critical incidents. More 'inward'-focused - limited communication outside the project.	and customer satisfaction.
R3	Role mainly specialist HC, limited SC and mechanistic PC.	Function was to ensure compliance and reporting, and to facilitate action as necessary. Mainly exploitative work.	Focus on adherence to the plan.

### 5.3.2 Case 2 – Healthcare Industry

Case 2 was a Healthcare support contract. This had been in existence for 25 years, with many of the staff remaining in place for that time, having started in the UK National Health Service (NHS) and the transitioning into a private sector provider. The work was to run the NHS administration system in part of England. It was expected that this would have been replaced as part of the wider NHS upgrade system, but due to budgetary constraints this has not been forthcoming and the existing system has been extended.

The total staff had reduced from 200+ to approximately 29 (although the possibility of outsourcing exists as a cost-saving measure). The financial reporting data (see Appendix D) showed that the work was broadly on track, yet this belies the more complicated reality of the projects that were being performed (indeed, this data is also inconsistent with the higher-level selection data back in Table 18). The 'project' is formally renewed every twelve months, but rather than being purely support (upgrades, bug-fixes, customer support), the staff have also undertaken two relatively major projects. Firstly, a large merger of two trusts' IT systems which had recently been successfully completed and was being extended to other aspects of their functionality. Secondly, an upgrade to their main system to enhance functionality which was being rolled out to their major clients.

The three interviewees were the Delivery Manager / Project Manager (R4), who was in charge of all the projects and staff. His primary focus was on managing the new project implementation, and he left much of the support work to his two support managers (R5 and R6). R4 was relatively new to the role, despite having significant experience elsewhere, and was keen to 'shake up' the rather staid group. R5 had been on the account for over 20 years, and had great expertise and knowledge of all the systems, as well as well-established contacts on the client side. She described a critical incident the week before, with a major system failure that they were still recovering from, which was not mentioned by R4. R6 also ran a team of seven, mainly focused on implementing small changes, and had been there for 25 years. His work was mostly technically-focused to ensure compliance, and he described the environment as relatively stable.

**Table 27: Summary of Roles in Case 2**

Individual	Input	Process	Output
R4	Mainly generalist HC, cooperative and entrepreneurial SC, mechanistic and organic PC.	Responsible for support and project delivery, nominally a more exploitative role. Examples of partitioning off the more exploitative aspects	Focus mainly on complex project delivery and new business.

		(support and small changes) to R5 and R6. Focus on both exploitation and exploration during the more complex projects, and on upward communication (including relationship-building) and future innovative business (exploration).	
R5	Specialist technical and generalist HC. A range of internal and external SC. Mainly mechanistic PC, organic flexibility when required.	Mainly exploitative at the technical level, working with internal team and customer. Role expansion in technical critical incidents. Focus on localised project delivery and specific problem-solving.	Focus on performance and customer satisfaction.
R6	Role mainly specialist HC, limited SC and more mechanistic PC.	Function was to ensure compliance and reporting, and to facilitate action as necessary. Primarily exploitative.	Focus on delivering small changes to the customer to plan.

### 5.3.3 Case 3 – Telecoms Industry

Case 3 was in the telecoms sector, a project to implement a flexible mobile pre-pay 'top-up' service for one of the UK operators, as part of a wider customer marketing programme. As shown previously in Table 18, it was highlighted as high risk, although of small magnitude. The PM (R7) on this particular project was a relatively small role, but the work itself was complicated due to the uncertain nature of the customer requirements, the details of which evolved rapidly according to changes in the consumer market. His role was to manage the development team, including offshore staff, and he was very much the main point of contact for all the ongoing issues. The complexity was characterised by pace and uncertainty, and although there was technical complexity in the implementation, the experience and expertise of the participants meant this was less of a challenge.

The Lead Analyst (R8) was mainly involved in data-reporting and ensuring compliance, and since he was involved in multiple projects, had little time to become heavily involved in the detail of each. Similar to the PMO Manager in Case 1, this was a strongly exploitative role.

The Programme Manager (R9) oversaw this project as well as many others (including Case 5, so one interview covered both cases). His role was primarily to coordinate all the work, ensure consistent processes and allocate resources according to priority. Although this is primarily exploitative, shifting demand from the customer could cause major changes in a short time so the whole group had to remain flexible and adaptive, and this resulted in praise from the client.

**Table 28: Summary of Roles in Case 3**

Individual	Input	Process	Output
R7	Both exploitative and exploratory HC, SC, PC.	Balancing exploitation (process and detail) and exploration (accommodating new and evolving requirements and building supportive relationships). Strong relationships and communication with both team and customer to achieve this – focal point of contact and responsibility. High complexity.	Focus mainly on complex project delivery.
R8	Specialist technical HC, minimal SC requirements, mechanistic PC.	Mainly exploitative at the reporting and process level, working with internal team. Relatively hands-off due to perceived lack of deviation from plan.	Focus on internal reporting and consistency.
R9	More generalist HC, but supported by in-depth project knowledge. Strong internal and external SC, mechanistic PC that allows rapid switching to organic.	Aiming for strongly exploitative function, but allowing for rapid temporal switch to adaptive reconfiguration when the customer changes their plan (exploration).	Focus on providing a delivery structure that can quickly adapt to customer needs.

#### 5.3.4 Case 4 – Finance Industry (Cheque-Clearing)

Case 4 was a support project for a high-street bank cheque-clearing system. Although in the support phase, there were still change projects running as part of the work. The work was deemed to be of higher complexity, although the pattern of performance was smooth. The team had been together for 10-12 years, and knew their areas very well. Although some were based in London, most were distributed around the country and included home-workers.

Three managers were interviewed, the overall PM (R10), the Change PM (R11) and the Application Support Team Leader (R12). R10 had been there for 10 years, and she looked after all the aspects of the work despite not being from a technical background. Her primary role was coordinating the work and managing the relationships with the client. A critical incident was with a recent major system failure offsite, and she had to organise the response and ensure communications with all the stakeholders.

R11 was from a more technical background, although his role was both technical and commercial in terms of negotiating change requests. He also managed and championed the innovative ideas pipeline within the account, whereby new opportunities are submitted by staff and reviewed by committee. These included improvements for the customer as a means to generate innovation. These were rewarded, and the scheme was valued by both the Company and the bank.

The Application Support Team Leader (R12) ran the small projects within the account, using a team of seven engineers distributed around the country. Despite the lack of co-location, they managed to organise ongoing flexible support whilst remaining relatively self-contained.

**Table 29: Summary of Roles in Case 4**

Individual	Input	Process	Output
R10	Both exploitative and exploratory HC, SC, PC. Primarily partitioned off detailed technical aspects to others and used her expertise in project management.	Mainly a focal point for the work, buffering other managers to enable them to focus on the technical detail. More of an enabler. Exploitative in terms of ensuring everything is completed correctly; exploratory in terms of stakeholder relationship management.	Focus mainly on complex project delivery.
R11	Technical and commercial HC, ambidextrous SC and PC.	Often exploitative project work, but with an explicit role to develop innovation. Buffered by R10.	Focus on delivery and implementing innovation.
R12	Both exploitative and exploratory HC, SC, PC. Again, partitioned off much of the detailed technical work.	Buffered by R10, but in turn buffered his own staff. Local focus, mainly exploitative, exploration in times of critical incident.	Focus on providing a delivery structure that can be adapted if necessary.

### 5.3.5 Case 5 – Telecoms Industry

Case 5 had similar requirements to Case 3, but was larger and more complex (note that detailed financial reports showed that the sampling data in Table 18 used to assess the budget was insufficient, both Cases 3 and 5 were actually larger than Table 18 indicated). It was a technical support system to target customers of the network with specific offers. The interviews were with the PM (R13), the Technical Team Leader (R14) and the Programme Manager (R9 – see Case 3)

The project was about nine months old and consisted of a number of technical sub-systems, coordinated by the PM (R13), who was also the primary point of contact with the customer and the individual with the best overview of the work. Again, the customer requirements were relatively fluid, requiring flexibility at the working level to accommodate the constant change. Some of the work was done by an ‘agile’ development team, over which he had no direct control, nor visibility, resulting in coordination difficulty. His critical incidents involved small issues that had larger systemic consequences, and his frustration at having to keep on top of all of them to avoid the project becoming derailed was evident.

The Team Leader (R14) controlled individual work-packages and the lower-level detail with the software engineering team and the customer technical staff. He had outsourced staff in Cairo, and at the time of the interview (January 2011) he was unable to contact them due to the unrest in Egypt, and having to deal with the consequences to the project.

**Table 30: Summary of Roles in Case 5**

Individual	Input	Process	Output
R13	Both exploitative and exploratory HC, SC and PC.	Balancing exploitation (ensuring details of delivery) and exploration (flexibility) to meet evolving requirements under uncertain conditions, including the use of an agile methodology). Strong relationships and communication to achieve this – focal point of contact and responsibility. High complexity.	Focus mainly on complex project delivery.
R14	Both exploitative and exploratory HC, SC, PC.	Exploratory and exploitative, taking responsibility for customer satisfaction as well as the detail of delivery. Significant role as ‘gap-filler.’	Focus on all delivery aspects being performed.
[ R9 ]	See Case 3.		

### 5.3.6 Case 6 – Government Services

This project was to implement a document scanning system for a large UK Government Department. The department had paper records for staff, and was moving to an electronic system. The work was 12 months in duration, and just completing at the time of the interview. The large repository of paper was being scanned in and held in a secure database. This was part of a wider centralisation and automation programme, and this project represented a new aspect of the client’s existing document management system. As such, the Company’s expertise in scanning systems was being used as part of a broader organisational change programme within the client. There was effective customer engagement, with both sides learning the most effective ways of implementing the system by developing and trialling an early prototype.

There were three interviews, the PM (R15), the Technical Lead (R16) and the PMO Manager (R17).

The PM (R15) initiated a series of workshops with the client at the start of the project to explore various options, and was primarily concerned with ensuring appropriate resourcing, progress and communications. His technical knowledge was adequate, but not detailed enough in the area of scanning to contribute strongly in that area. His main critical incident was at the go-live date, when two other projects that had been delayed were also scheduled to be implemented on the same weekend, so he was heavily involved in that coordination.

R16 was mainly involved in running the small technical team, and was flexible in the technical approach that was taken, working closely with the customer to define the best solution. His most significant critical incident was just after the go-live, when a potentially serious operating issue was identified and resolved. Again, this was a significantly different CI response than the PM.

The PMO Manager was remote from the work, focusing on reporting and financial data, and attributed the project’s success to rigorous planning and execution, which



was in contrast to R15 and R16, who emphasised the flexibility, exploratory activities and relationship-building as key components of the outcome.

**Table 31: Summary of Roles in Case 6**

Individual	Input	Process	Output
R15	Both exploitative and exploratory HC, SC, PC.	Mainly 'upward' management, buffering the technical staff to deliver the work. Primarily an integration role to ensure that the exploitative activities were done by others, but with a flexible, evolving set of requirements with the customer.	Focus mainly on complex project delivery.
R16	Both exploitative and exploratory HC, PC, although primarily exploitative SC.	Exploratory and exploitative, taking responsibility for customer satisfaction as well as the detail of delivery. Creativity hidden from PMO (R17) by R15.	Focus on all delivery aspects being performed.
R17	Highly exploitative role, despite extensive experience.	Primarily exploitative (process-adherence and reporting), although relatively remote from the day-to-day operations.	Focus on reporting and keeping the project on track.

### 5.3.7 Case 7 – Finance Industry (IT Systems for Bank Loans)

From the Company high-level data (Table 18) this appears to be a higher-complexity project, and from the financial data (see Appendix D) had a performance that was broadly on-plan. The work was notionally an outsourcing and support contract for selling bank loans but in the last year they had been involved in a large integration of two recently-merged banks' IT systems, and also a major change in the business process due to legislative changes over the last year. This was in addition to minor upgrades and support.

There were five interviews: the Applications Service Manager (effectively the Programme Manager, R18, also in charge of all ongoing support), the Project Manager (R19), Technical Lead (R20) and Team Leaders (R21 and R22). All were co-located in the same office although some of the work was distributed to other sites in the UK.

R18 preferred to take on more technical tasks, despite his managerial role, and was conversant with all the technical detail of the bank IT systems. Much of his role was also spent in stakeholder management and responding to customer requests. The two new projects had been stressful due to the tight timescales, visibility at high levels of both organisations, and incomplete requirements on the customer side.

The project manager, R19, primarily took on the project detail, but did not get too involved in the purely technical aspects, although he was the main point of contact. R20, R21 and R22 were mainly concerned with batch loan processing, technical change and ongoing support respectively, and although they were aware of the others' work, focused on their particular area of expertise. The higher-level view was obtained from R18 and R19.

**Table 32: Summary of Roles in Case 7**

Individual	Input	Process	Output
R18	Both exploitative and exploratory HC, SC and PC.	Mainly an integrative role, but willing to delve into the details to help solve issues. Both exploitation (strong involvement in the technical elements) and exploration, the latter in exploring new technical solutions.	Focus mainly on project delivery and stakeholder management..
R19	Both exploitative and exploratory HC, SC and PC.	Exploratory and exploitative, taking responsibility for customer and supplier relationships as well as the details of delivery (including resolving invoicing issues), although a limited technical role.	Focus on all delivery aspects of the projects.
R20	Tendency towards a more exploitative role in HC, SC, PC. Extensive technical experience, working primarily with the project team.	More exploitative at the high-level technical side, limited input to the wider project or customer side. Ongoing problem-solving as part of the role.	Mainly technical performance.
R21	Exploitative HC, SC, PC. Limited customer engagement.	Focus on technical performance and systems management, mostly exploitative. Ongoing problem-solving, limited scope for innovation.	Technical performance and stability.
R22	Both exploitative and exploratory HC, SC and PC, long-standing engagement with the customer.	A mainly exploitative role, but with a demand for flexible problem-solving to overcome issues rapidly.	System stability in batch payment processing.

### 5.3.8 Case 8 – Defence Industry

This case was used as a final comparison since the bulk of the analysis was performed on the first 7 sets of data. The defence case was chosen to gain exposure to this area of industry. The purpose of the project was to update a large database in charge of central payment administration, moving to the latest version of the software whilst minimising disruption to ongoing operations. Due to the bespoke nature of the configuration (estimated by the database vendor to be one of the most complex in existence), this was a significant task.

Much planning went in up-front, yet when the upgraded system went live, there were a considerable number of issues that generated high-level attention for both the Company and the client. These were addressed one-by-one by the manager and the team, also bringing in expertise from the database provider. The PM (R23)

was the primary point of contact for both the detailed technical work and also as the main stakeholder contact. His coordination minimised the potential for confusion due to inconsistent information flow, and the problems were resolved to the client's satisfaction.

R24 was the test manager, focused on ensuring the upgrades were tested before going live. His role was buffered by R23 and although he had flexibility to do the work as he saw fit, it was a relatively stand-alone role.

R25 was the PMO lead, focusing on planning and tracking. He had more input than PMO staff interviewed on other cases, and accommodated flexibility by allowing multiple planning scenarios, working with R24. R26 was a technical lead, employed for his expertise with the database system and was able to solve the ongoing performance issues after the 'go-live' based on his, and others', technical knowledge and judgement.

**Table 33: Summary of Roles in Case 8**

Individual	Input	Process	Output
R23	Both exploitative and exploratory HC, SC and PC.	Mainly an integrative and leadership role, with a solid appreciation of the technical detail. Both team leadership and a significant role in stakeholder management when the system implementation did not work as planned. Exploitation (rigour and control) with exploration (problem-solving under difficult conditions).	Focus mainly on project delivery and managing multiple stakeholders.
R24	Mainly exploitative HC, SC and PC.	Primarily exploitative role, owning the testing of the system. Freedom to do what he thought most appropriate, but limited scope outside of that particular area.	Focus on testing and compliance, reporting to the PM.
R25	Tendency towards a more exploitative role in HC, SC, PC; drawing on previous experience and exhibiting some exploration.	Primarily an exploitative planning / PMO role, although using previous experience to develop an appropriate planning technique drawing on multiple inputs.	Mainly planning and reporting, responsible to PM.
R26	Mainly exploitative HC and SC, exploitative and exploratory PC.	Focus on technical performance, problem-solving and systems management, mostly exploitative. Because of the complexity of the system, can be classified as both exploitation (fixing issues) and exploration (finding new ways to solve those issues).	System technical performance improvement. And stability.

## 5.4 Analysis Methodology and Findings

### 5.4.1 First- and Second-Cycle Coding

The first cycle of coding was to code the transcript data using the initial, a priori coding scheme (as shown previously in Table 24). Again, this was derived primarily from the Phase 1 research interviews (the use of intellectual capital, exploitation and exploration), together with the incorporation of concepts derived from previously-used survey instruments. The reader is also referred back to the methods chapter for further information.

Other codes were used to identify project complexities, critical incidents, time aspects, project environment, history and individual job roles to aid in the analysis. Where text was identified as, for example, *exploitation*, but did not readily fit the sub-categorisation, it was coded under the general category of '*exploit*'. This was also used for exploration and the intellectual capital elements. Note that there was not sufficient repetition of any new ideas to identify any additional sub-categories.

The full initial coding table from all eight cases is shown in Table 34. Note that the rationale behind some of the new ideas will be elaborated shortly.

**Table 34: Phase 2 Coding Results**

Code	Sources	Refs
Complexities (C)	1	1
<i>Dynamic</i>	19	25
<i>Pace</i>	18	25
<i>Socio-political</i>	23	43
<i>Structural</i>	25	76
<i>Uncertainty</i>	17	35
Critical Incident (CI)	19	59
Environment	10	14
Exploit (X1)	10	28
<i>Change Control</i>	16	50
<i>Client Feedback</i>	14	28
<i>Knowledge and Sharing</i>	20	49
<i>Learning from Experience</i>	19	43
<i>Objectives and Client</i>	17	27
<i>Robust Processes</i>	26	103
Explore (X2)	13	24
<i>Develop Relationships</i>	17	25
<i>Innovation and Flexibility</i>	25	65
<i>Long-Term Client Benefit</i>	11	21
<i>New Way to Satisfy Client</i>	12	22
<i>Plan to Accommodate Problems</i>	15	32
<i>Process Flexibility</i>	23	70
Human Capital (HC)	4	6
<i>General Experience</i>	16	34
<i>Overview</i>	20	49
<i>Process Experience</i>	15	21
<i>Specialist</i>	23	57
History	6	15
Meta-Themes	-	-
<i>Buffer</i>	14	20

<i>Constraints</i>	12	28
<i>Distributed Ambidexterity</i>	17	25
<i>Gap-Filling</i>	9	12
<i>Integration</i>	21	64
<i>Point Ambidexterity</i>	10	17
<i>Role Expansion</i>	11	17
<i>Self-Adjustment</i>	7	8
<i>Set Tone</i>	13	27
Outcome	20	31
Project Capital (PC)	6	18
<i>Flexible Systems</i>	21	58
<i>Judgement</i>	13	16
<i>Lessons-Learned</i>	15	22
<i>Standard Procedures</i>	26	90
<i>Tailoring</i>	11	20
Project	20	47
Role	23	74
Social Capital	8	22
<i>(In)formal Communications</i>	23	79
<i>Co-location</i>	14	24
<i>Easy to Talk</i>	13	20
<i>Relationships and Ties</i>	23	69
<i>Trust</i>	11	18
Time	-	-
<i>Beginning</i>	13	19
<i>End</i>	8	9
<i>Middle</i>	7	11

As noted shortly, although the critical incident method was used as part of the interview protocol and was expected to provide insight into managerial exploitative / exploratory behaviour under these circumstances, this did not readily offer significant differences in managerial behaviour. Instead, critical incidents seemed to involve a 'more intense' (e.g. more coordination, more communication) version of the activities performed under 'non-critical-incident' situations. However, the role of complexity, and the managers' opinions regarding it, was found to be valuable and a useful way of framing project issues, and so these aspects were coded. As will be discussed, managers on the same project were found to have differing opinions on both of these aspects.

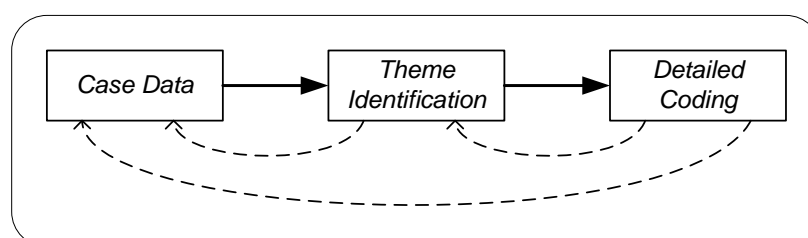
Because of the multiple interactions of the a priori elements within the managerial action, first-cycle coding again used *simultaneous coding* (Miles and Huberman, 1994:66; Saldaña, 2009:62) using NVivo 8 since this captures the richness of the interplay.

The cases and summaries of individual responses were written up in detail in order to better understand the project and the role of the managers within it. It became apparent during the analysis that this coding was not sufficient to explain the orchestration of ambidexterity at the project level, and several key themes emerged from the data. These were developed as simple memos, notes and questions as the analysis progressed (Corbin and Strauss, 2008:117-141; Miles and Huberman, 1994:72-5; Partington, 2002b:143; Strauss, 1987:109-129).

To refine these emergent themes, second-cycle coding was performed more in line with '*pattern coding*' (Miles and Huberman, 1994:69-72; Saldaña, 2009:152-5) than axial coding (Easterby-Smith et al., 2008:179-80), since the research was not based on grounded theory. Miles and Huberman (1994:69) ask: "Given a working set of codes that describe the phenomena in transcribed field notes, how can the researcher move to a second level – one that is more general, perhaps more explanatory?... We need to understand the patterns, the recurrences, the plausible whys."

They continue (Miles and Huberman, 1994:69), "Pattern codes are explanatory or inferential codes ones that identify an emergent theme, configuration, or an explanation. They pull together a lot of material into a more meaningful and parsimonious unit of analysis. They are a sort of meta-code."

A simplified process diagram is shown in Figure 64. Multiple new themes were identified from considering the data, then these were added to the coding scheme and further coding performed. By continuously comparing to the data and refining the ideas, this resulted in stabilisation of the final model (shown later) and the coded data could be analysed.



**Figure 64: Second-Cycle Analysis**

The following ideas emerged. These are now identified, described in more detail using case evidence, then discussed as a whole.

#### **5.4.2 Second-Cycle Analysis – Configurations and Context**

Previous conceptions of ambidexterity (structural, temporal, contextual) were insufficient to fully characterise the complicated organisational structure and operations, as discussed earlier. In comparing the responses of the interviewees, it was also clear that a simple, single view of project-level ambidexterity was not sufficient. The responses showed that individuals had different perspectives regarding their focus (technical performance, dealing with key stakeholders, ensuring consistent use of Company processes, etc.) and in none of the cases did the managers give the same level of attention to the same aspects. Complexity assessments also varied considerably between individuals on the same project. In some cases, critical incident reporting was inconsistent (people focusing on different, though major, incidents), and this implies that a single, shared, conception of 'the project' was not identifiable. For example, if the project manager focused primarily on the stakeholder management, the technical manager on overall system performance and the support team leader on resolving ongoing customer issues, a view of 'the project' as being primarily exploitative or exploratory is not necessarily meaningful, it has more complicated nuances at the micro-level.

Because there were differing views and varying patterns of exploitation and exploration at the individual level, this led to what I identify as *distributed ambidexterity* within the project. Additionally, there were points where key individuals demonstrated ambidextrous operation whilst others were more

exploitative, and this was to be expected given the nature of the work. I term this *point ambidexterity*. The understanding of these terms is given below, for clarity, followed by further explanation.

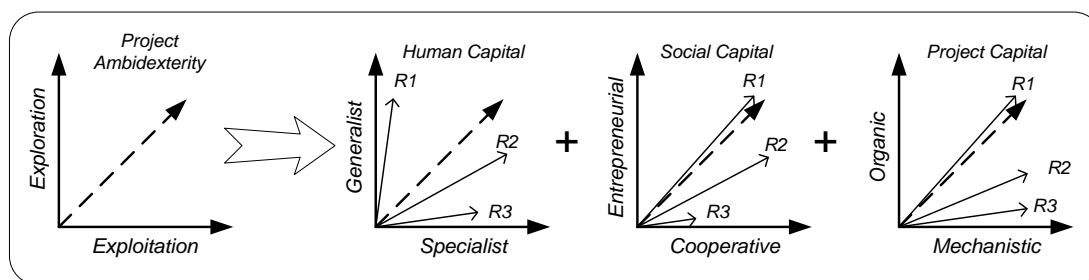
*Distributed Ambidexterity: The pattern of exploitative and exploratory practices amongst a group of individuals, the sum of which provides exploitation and exploration at the level of the group, organisation, project or work unit.*

*Point Ambidexterity: An individual who is a significant actor in creating group- or project-level ambidexterity, performing or coordinating both exploitative and exploratory activities that are not replicated by other individuals.*

#### 5.4.2.1 Distributed Ambidexterity

An example of ‘distributed ambidexterity’ was evident in the first case (Case 1), where the Project Manager introduced more controlled processes into the work to enable smoother operation (exploitation), whilst also building relationships to try and smooth issues within the customer-supplier-subcontractor network (exploration). Meanwhile, the Service Delivery Manager was responsible for the detailed technical aspects of the work (exploitation), whilst also developing creative solutions given the changing requirements and focus of the customer. Hence both individuals demonstrated exploitation and exploration, but the activities they undertook were quite different. So, at the project-level, progress was made, but this highlights why a simple view of project-level exploitation and exploration could not readily be generated from a single respondent. The respondents’ views were not generally consistent, on two counts. Firstly, they were each asked for their thoughts on the project complexity, along the five dimensions highlighted back in Figure 49. There was a tendency for each to focus on the importance on the aspect with which they were most involved. In the above example, the project manager was mostly focused on structural coordination and the socio-political issues with the ending of the contract, whereas the SDM was more involved with the detailed technical issues. Secondly, the critical incidents were also inconsistently reported. The PM highlighted the contract issues, the SDM the significant technical challenges that had been overcome. These differences are understandable, and indicate that project-level performance is a combination of the work of the actors within it.

Distributed ambidexterity can be further explored using the within-case comparisons. The ‘input’ column summarises the IC that each participant brought to the case, and this distinguishes their contribution. It is evident from the cases that different participants play different roles in the achievement of project-level ambidexterity. Table 26 for Case 1 indicates this, but this is also shown for the other cases as well. We can see that for each case, all six of the Kang and Snell (2009) elements are present, but not necessarily embodied in the project manager. Using Case 1, this is illustrated in Figure 65, whereby R1’s HC is more exploratory whereas R2 and R3 are more exploitative. Between them, therefore, both aspects are covered (indicated by the dotted arrow to represent the sum of the contributions). This is necessarily a simplified conception, since various forms of specialism are required (project management knowledge, different forms of technical expertise, and so forth), but it is an informative method of representing the IC at the project level, given a number of respondents. It should be emphasised that this is a representation of qualitative data, and is not intended as accurate quantitative data. However, it is an interesting graphical method of understanding and portraying some ideas of distributed ambidexterity.



**Figure 65: Indicative IC Analysis for Case 1 – Distributed Ambidexterity**

In most of the cases, the project manager in fact demonstrated both exploitative and exploratory aspects in all three IC elements. In these cases distributed ambidexterity is still demonstrable due to the different focus of individuals, however Figure 65 provides a practical illustration. Even with an example, though, the idea of distributed ambidexterity remains a rather ‘slippery’ concept. It is a way of recognising that the conception of project-level ambidexterity is not consistent amongst the project participants, but that exploitation and exploration at the project level can be considered as the sum of the individual contributions. It can also involve bringing in specific resources and is not necessarily a static condition.

The case data highlighted that individual respondents had views on complexity and critical incidents that were inconsistent when compared to their colleagues, and their perspectives on each were dependent upon their role (technically-focused, or centred upon dealing with customer issues and contractual obligations, and so forth). Hence different individuals could demonstrate ambidexterity in line with their function. Various ‘loci of ambidexterity’ would therefore combine to produce project-level ambidexterity. Managers respond to perceived complexity and manage it in line with their role, yet there was not an overarching ‘project-view’ that was identifiable from these cases.

One idea considered as part of this work was that all six of the intellectual capital model elements should be evident, and that if different elements were embodied in different individuals, then one way of understanding the distribution would be to see where each resided. A lack of one or more of the elements overall might then be associated with poorer performance, and therefore would be an interesting further investigation of the benefits of the model in this context. However, each of the eight cases demonstrated all six elements, and so this was not usefully testable. In instances where the manager was not from that particular technical background (e.g. Cases 1 and 4), technical expertise worked alongside to fill that role, and so no ‘gaps’ were identified in that respect.

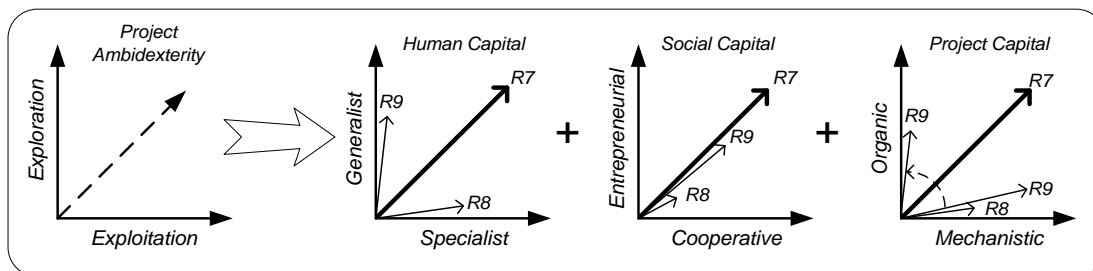
The only evidence to support the idea that all six elements should be present was from interview 15 of the Phase 1 research, when all the social relationships between the members of a delivery consortium had been heavily damaged, severely reducing trust and thereby impacting the ability to work together. There is therefore limited evidence to support this idea, and this difficulty is further compounded by the multiple activities that can be categorised within each of the IC elements. However, this remains an interesting theoretical perspective to potentially extend and investigate further.



#### 5.4.2.2 Point Ambidexterity

‘Point ambidexterity’ is when an individual plays a key role in determining or influencing project-level exploitation and exploration. An example of this is Case 3, where the Project Manager was the primary contact with the customer and instrumental in working with them to determine technical and commercial solutions which were then implemented, under conditions of change and uncertainty. His role was therefore important in both exploring the new solutions and the route to implementation, and ensuring that the detailed work was performed as required. Interestingly, his exploratory activities meant that the subsequent tasks for others were actually better-defined and therefore more exploitative, and it could be argued that the higher-level exploration enabled the later, lower-level, exploitation. This is illustrated in Figure 66 (based on Table 28), where the Project Manager (R7) plays a central part in the project and demonstrates ambidextrous HC, SC and PC. The PMO Lead Analyst (R8) and Programme Manager (R9) played less important roles and did not demonstrate so much ambidexterity (note that R9 was primarily concerned with mechanistic PC at the project level, but exhibited organic flexibility above the project level, for example when resources needed rapid re-allocation between projects due to urgent customer demands). Again, these are only illustrative diagrams from the qualitative data.

In Case 3 no other individual interviewed demonstrated ‘point ambidexterity’, but point and distributed ambidexterity are not necessarily mutually exclusive, and can co-occur (as shown later). However, Figure 66 provides an interesting illustration at this stage.



**Figure 66: Indicative IC Analysis for Case 3 – Point Ambidexterity**

Point ambidexterity is also challenging to define completely as a concept. As shown later in Appendices E and F, the interview quotes show how individuals can play a significant role in influencing project-level ambidexterity via their own exploitation and exploration. It is also linked with critical incidents, in that the manager becomes the focal point of contact for all the stakeholders for the duration of the incident. Under these circumstances, much of the orchestration of project-level ambidexterity is therefore dependent upon this individual, with an identifiable ‘locus of ambidexterity’. Cases 3 and 5 demonstrated this well.

#### 5.4.2.3 Self-Adjustment

The relationship between the managers and their individual exploitative / exploratory practices also exhibited a tendency to *self-adjust* according to the other project participants. Individuals undertook activities consistent not only with their personal ability and responsibility, but also in accordance with the other individuals on the project. Practices were therefore not just a function of the IC that he/she brought to the project, and their role, but were mediated by an understanding of the responsibilities and skills of others. In some instances this was explicit, when

respondents described how they and their teams responded to issues, but it emerged as a theme within the cases in that managerial actions were not purely a function of the individual and the task. Instead, they were also dependent upon the others with whom he or she had to work. For example, in cases 1, 4, 6 and 7 the project managers left the bulk of the technical work to the technical managers and limited their own involvement in that detail. Had the technical manager been inadequate or absent, though, the PM could have stepped into that role, but he/she did not need to under the circumstances. In Case 2, the two team leaders reporting to the PM partitioned work between them, as was the situation in Case 7, and in Case 6 the two technical leads also worked together to ensure smooth progress, not relying on day-to-day direction from the PM.

The idea of self-adjustment was evident in considering how the project work was being achieved in the cases. The quotes in Appendices E and F indicate the effect, in that individuals adjust their work and practices according to both the issues of the moment and also the nature of the staff with whom they are working. Further analysis shows that two forms of this can be identified. Firstly, the relationships between the managers means that each can focus on his or her primary area, with the emphasis on their own domain knowledge and responsibility. This is evident especially in Cases 1, 4 and 7, and is more of a 'top-down' argument that is not well-captured in direct quotes. A lower-level manifestation is in the more continuous 'micro-adjustments' evident in team responses to work requirements to develop appropriate exploitative and exploratory responses, and these are highlighted more in the quotes.

The relationship between self-adjustment, point ambidexterity and distributed ambidexterity is not straightforward, and the adjustment could be quite dynamic. For instance, the project manager taking a more 'hands-off' approach to the technical side of the project in response to recognising the expertise of the technical manager may be reconsidered under critical incident conditions. Under these circumstances he/she may be required to coordinate and report more widely, thereby having to be involved in more significant technical decision-making for the duration. In this example, the configuration can move from a more distributed ambidexterity model to one where point ambidexterity from the PM is more prevalent (an example of this occurred in Case 6). The three concepts are linked and should not be considered as independent.

#### **5.4.2.4 The Role of Project Context**

The practices were also responses to the project environment and context. The ideas of complexity and critical incidents were discussed, but another emergent theme was that of the *capacity and constraints* within the project operations (such as staffing levels, process requirements, budgets, timescale, and customer demands). This limited the range of responses to situations (e.g. staff could not be brought in to help solve an issue, novel technical solutions were outside the scope of the project, and so forth).

#### **5.4.3 Second-Cycle Analysis - Managerial Practices**

Five managerial practices also emerged from the data as part of the analysis, identified as part of the memo and note generation during the analysis (Corbin and Strauss, 2008:117-141; Miles and Huberman, 1994:72-5; Partington, 2002b:143; Strauss, 1987:109-129). These are now presented (in alphabetical order) and discussed with example quotes. Further detailed coding evidence is subsequently presented in Appendix E, but an overview is given here.

#### 5.4.3.1 'Buffering'

With 'buffering', the manager evidently acted as a barrier to prevent unwarranted distractions affecting the team performing the tasks, and this was independently reported by both the managers describing their actions, and their staff highlighting the benefits of the 'protection' this offered. It was most evident in Cases 1, 4, 6 and 8.

*"I think they also felt that they needed someone to look after them from the point of view of shielding them a little bit... not by trying to manage what they do or how they manage their time or anything like that but sort of a bit of a voice of reason to say 'you can't ask him to do that, he's too busy.'"*

Whilst attempting to prevent communication may appear counterintuitive, the benefit is highlighted from the quotes in Appendix E. If the manager is the central point of contact, this can have two advantages. Firstly, a coordinated and efficient approach to team knowledge-sharing can be implemented (e.g. the weekly project meeting). Secondly, this reduces the likelihood of team members being overwhelmed by task requests from the customer that may be at odds with the project plan. Buffering can be intrinsically linked with the 'integration' function (as subsequently demonstrated in Appendix F) in that the project manager, under these conditions, is best placed to see the overall project and how the work should best be progressed. In this way, more efficient exploitation or exploration (for example, engineers being able to focus on their detailed work with less interruptions) may be achieved.

#### 5.4.3.2 'Gap-Filling'

There were examples where the manager deliberately overcame deficiencies by performing tasks that he/she knew were necessary but were not, for various reasons, being performed. I termed this 'gap-filling'.

*"If you say to him, 'I think you need to get this 42-page document that you produced reviewed.' 'Why? Why should I?'... So you have to, you know, so you've got people like that who will say, 'Look, I'm not touching this at all, ever.' And you just let him get on the work then and you do the processes... and then put a tick in the box."*

'Gap-filling' was an unforeseen practice, but one that was identified from the data. The project manager role is that of ensuring delivery of all requirements, and it may be that the PM has the best overview of all the processes that may be required to be met. Technical staff may be focused on the particular technical solution and not be minded to follow this up with appropriate documentation or follow the review processes (as shown in Appendix E), and so it can fall to the manager to ensure that the details are met. This is primarily an exploitative function that supports the wider knowledge-generation within the project, and was a finding from the data. Whilst the evidence was not widespread throughout the interviews, I have performed this function myself managing technical staff (albeit in a different organisation) and can attest to its importance in ensuring compliance when the project is formally reviewed.

### 5.4.3.3 'Integration'

The integration role was strongly evident from the cases, that of actively bringing together the knowledge within the project and its participants to create a coherent whole.

*"...so now I am the only [customer] project manager. A kind of everything role."*

One of the key functions of the manager is to bring together individuals (who may not be directly under his/her control) to achieve the project goals. In so doing, often disparate skills (such as software, hardware, finance and so forth) need to be harnessed for the delivery to be a success. This can involve reconciling the customer requirements with the contractual obligations, since these may diverge over time. Integration is likely to involve both exploitation (for example, adherence to appropriate processes) and exploration (ensuring that new problems are solved as a result of the activity). Meetings and regular communication to ensure alignment of the stakeholders, project staff and the overall objectives are important in enabling this integration.

Whilst integrating exploitative activities to enable exploitation at the project level is relatively clear-cut (for example, bringing together technical expertise to meet the performance requirements), this is not necessarily so straightforward for exploration. Exploration at the project level may actually be enabled through the practices of the project manager by bringing together more exploitative elements. This was most notable in Cases 3, 4, 5 and 7, where the integration of technical expertise to achieve new goals was coordinated by the manager, who was the primary point of communication with the customer. Indeed, in Case 5, the use of an agile software team with staff not formally allocated to the project shows how the achievement of new goals can be met by breaking the tasks into smaller, exploitative work-packages undertaken by individuals unfamiliar with the 'bigger picture' of the project. It is therefore the manager's role to integrate this effort, and as such is in line with the concept of structural ambidexterity.

However, whilst the previous literature focuses on the structural separation of exploitation and exploration, coordinated by senior management, this raises an alternative possibility. Given the multitude of tasks that may be conceived as exploitative, the managerial role of integration may be where *exploration* can be understood as occurring, enabling ambidexterity at the project level. This was not an explicit part of the research process, and the evidence was not specifically sought. However, it is a rational assertion if one considers the project manager with a staff of technical experts. He or she is charged with delivering a novel project, using the work of staff who may exhibit strongly exploitative HC, SC and PC. This is an alternative interpretation and extension of structural ambidexterity theory, in that the location of the exploratory competence may reside with the manager, and this may be worthy of further investigation.

### 5.4.3.4 'Role Expansion'

*'Role-Expansion and Ownership'* – this was identified primarily as a response to critical incidents when exploitative and exploratory activity increased to deal with the situation.

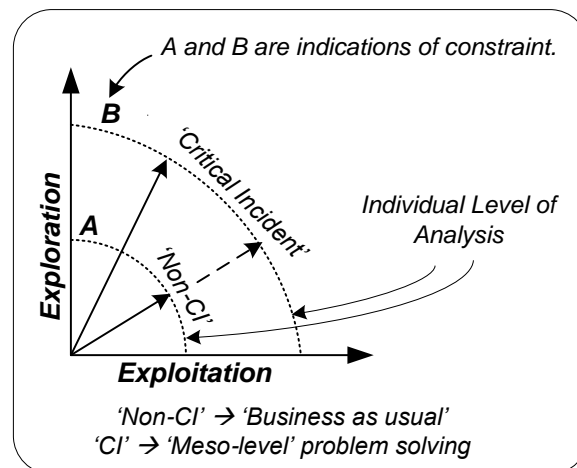
*"So I raised a relatively high level of escalation about a year ago and I spoke to somebody relatively senior, the UK Ops manager... I had to renew the*

*escalation, arse-kicking and pushing on a relatively regular basis. Because even at a relatively senior level, there didn't seem to be a lot of manager support."*

A simple indication of the effect of role expansion is given in Figure 67, below. Under 'non-critical incident' circumstances (line A) there is a certain level of exploitation and exploration that can be achieved, given the constraints of the work. Under critical incident conditions, the respondents generally indicated that this was a more 'extreme' version of non-critical incident conditions, with, for example, much more communication, coordination, reporting, and problem solving.

It did not appear that the response to critical incidents generally moved activities from, say, an exploitative to an exploratory mode, rather that the activities were similar to the 'business-as-usual' operation, but far more intense. This is indicated by line B, showing that the level of activity is 'greater' with the constraints moving. Examples would be the allocation of more resources simultaneously, reporting to senior management every few hours rather than weekly, and the application of trial technical solutions that previously would have been tested in a much slower timescale. Significant constraints would still be in place, though, since the project would still generally be subject to the same process demands, customer requirements and technical limitations as before.

It should be noted that more extensive exploitation and exploration at the organisational (or customer interface) level of analysis (such as a revised set of operating processes or methodology, or the wider adoption of new technology platform) are not controllable at this project level, and so the range of potential solutions to any project issues or critical incidents is necessarily bounded by practical considerations.



**Figure 67: Indication of Role Expansion and Constraints**

'Role expansion' emerged primarily as a response to critical incidents (although not all the coding involved this), in that under these circumstances the manager is required to do 'more' of what he or she normally does (communication, coordination, and so forth). It is interesting that, as shown in Table 35 shortly, 'role expansion' is commonly associated with 'integration', indicating the interweaving of these requirements. The concept was identified more as a 'top-down' theme rather than from 'bottom-up' quotes.

However, referring back to the diagram of Figure 67 it appears that the exploitative and exploratory activities can expand (and subsequently contract) according to the

circumstances. I term the movement of this line ‘breathing’ as a response to the particular situation. A typical example would be when a major technical fault occurs, requiring imaginative fixes and significantly increased communication on the part of the manager until incident is resolved. This generally falls to the manager, who is generally perceived as the ‘owner’ of the problem. However, these faults can be considered on a continuum with crises / critical incidents at one end, but also more minor (generally shorter-duration) ‘events’ that also require urgent attention (hence some of the ‘role expansion’ coding of the data was not associated with the critical incidents). The range of responses and solutions is limited by the organisational and customer constraints, although more options and resources may be available under more difficult conditions.

#### 5.4.3.5 ‘Setting the Tone’

The role of the manager in setting the exploitative / exploratory ethos for the project emerged from the data as an important, though not necessarily central, theme. I termed this ‘Setting the Tone’, enabling an environment where exploitation and exploration are supported.

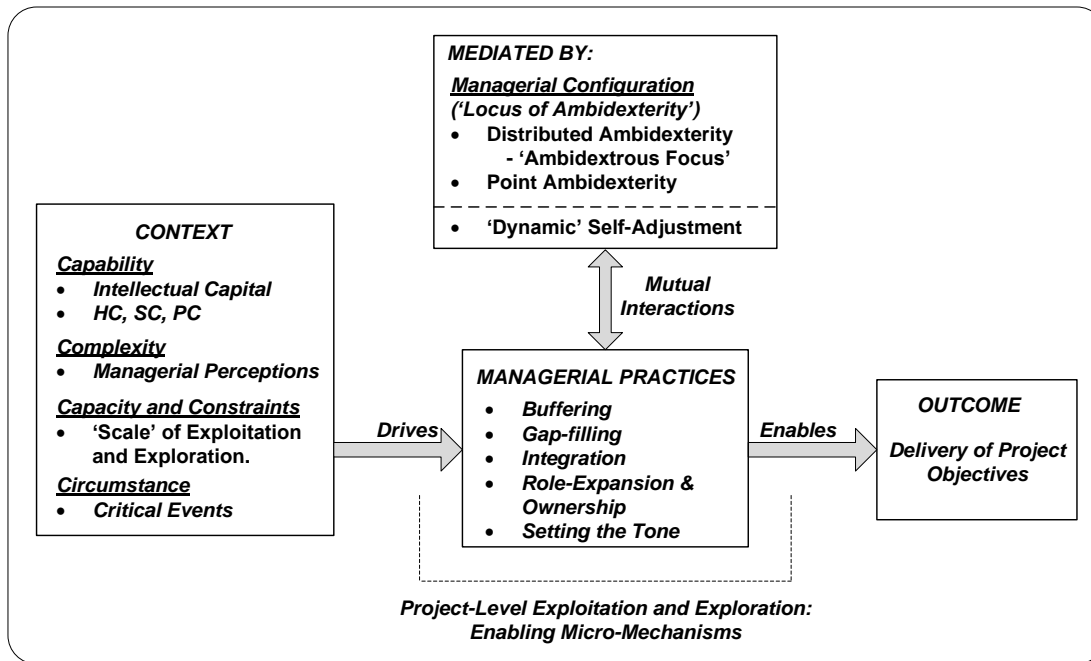
*“Culturally, they are dinosaurs. But it’s a legacy they’ve had and it has to change. The management within the team has to change. I’m just a newcomer with a completely different background.”*

This can be compared to the concept of contextual ambidexterity, although at the micro-level, a finer granularity can be studied. From these cases we can see that the manager can ‘set the tone’ of the work, and this was mostly in ensuring a stronger adherence to the organisational processes and/or adoption of new techniques (more exploitative), but also in working with the customer to advocate flexibility (Cases 3, 5 and 6). Setting the tone is therefore more than a function of leadership, but can also be co-created with the customer to identify the balance between exploitative and exploratory orientations such that a consistent, shared, approach is undertaken.

#### 5.4.4 Overall Model from the Case Studies

An extra nine elements were added to identify and code these concepts (*distributed* and *point ambidexterity*, *self-adjustment*, *constraints* and the five practices above). This model was shown at the beginning of the chapter, and now the underlying rationale has been given.

The analysis was used to develop the model of Figure 68 whereby the project ‘inputs’ form the context in which the managerial practices are performed, to generate to the desired outcomes.



**Figure 68: Enabling Project Exploitation and Exploration**

A second cycle of detailed coding was performed to identify these concepts in the interview transcripts. Note that these were successfully identified in individual paragraphs, but also that the ideas emerged from a holistic understanding of the cases. The concepts were therefore identified 'top-down' although here they are reported more as 'bottom-up' evidence. The case quotations used should therefore not be interpreted as the totality of the argument supporting the claims, but the analysis does allow a greater understanding of the underlying mechanisms enabling ambidexterity.

#### 5.4.5 Theoretical Saturation

The achievement of theoretical saturation is an important factor in determining when to cease further case studies. Partington (2002b:151-2) argues "Theoretical saturation is achieved when no new categories or properties are found, and all further instances of data merely add to the bulk of specific instances of already-discovered categories and properties. When this point in the analytical process is reached, it becomes instinctively clear to the analyst that the time has come to allow the emerging theory to solidify." Eisenhardt (1989:545) describes it as "simply the point at which incremental learning is minimal because the researchers are observing phenomena seen before." See also Corbin and Strauss (2008:143), and Saldaña (2009:161-2).

Initial coding was based upon the a priori coding framework, and the 'meta-codes' (Miles and Huberman, 1994:69) were derived from considering the findings of the cases. The broad concepts of distributed and point ambidexterity, and the five practices in Figure 68 were identified and developed with the first five cases, and further evidence and refinements gathered in Cases 6 and 7. The model of Figure 68 was constructed at this point. Case 8 was intended to both seek further evidence to confirm or disconfirm this model, and to look for any new concepts. Both in the interviews themselves and in the subsequent analysis, there was a sense of 'déjà vu' with regard to the discussions, even though the industry context, implementation issues and technology were new. This use of 8 cases is also in line with Eisenhardt's (1989) recommendation of between 4 and 10 cases.

### 5.4.6 Second-Cycle Coding Results

The elements identified in Figure 68 and coded in the second cycle were classified in terms of their co-occurrence with the previously developed coding scheme. The responses of the individuals were highlighted in terms of HC, SC, PC, Exploitation (X1) and Exploration (X2), Critical Incidents (CI), Outcome (O), Complexity (C) and Capacity and Constraints (CC). The coding elements were based on Table 24, and if, for example, the paragraph was coded with two elements from HC then this is referred to as 'HC(2)', and so forth. The results are shown in Table 35 and Table 36, indicating both unique coding status (e.g. an example of 'buffering' as 'C+HC') but also the incidences where multiple new themes were themselves parallel-coded, showing that they are not isolated concepts, but can also be understood in conjunction with each other (such as 'buffering' and 'integration').

**Table 35: Second-Cycle Coding Results: Single Codes**

Theme	Quantity	Coded With
Buffering	11	C; CC; HC; PC C; HC C; HC; X1 C; X1 HC PC PC SC SC SC(2) SC; X1
Gap-Filling	2	HC; PC; X1 HC(2); SC
Integration	29	C(2); CC; PC; X1; X2 C; CC; SC(2) C(2); CI; PC; SC; X1 C(2); CI; SC; X1 C; CI; X1 C; HC; PC; X1 C; PC; SC(2) C; PC; X1(3); X2; C; SC; X2 C; X1(2); X2(2); CI; HC; X1 CI; HC; X1; X2 CI; X2 HC HC(2) HC; PC; X1 HC; SC; X1 HC(2); X2 PC PC PC; X2 PC; X2 SC; X1(2); SC; X1(2); X2



		SC; X1(2); X2 SC; X2 X1(2) X2 X2(3)
Role Expansion	6	C; PC; X1 C; CI; PC; SC(2); X1 CI; HC; O; PC; SC CI; PC(2); SC; O; X1(4) CI; SC(2) HC; PC; SC
Set Tone	15	C; CI; X2 C; PC; X2 C; SC CC; HC; PC; X1 CI; SC; PC; X1; X2 HC; PC; X1 HC(2); PC; X1 PC; SC PC(2); X1 PC; X2 SC(2) SC; X2(2) X1; X2 X1(2); X2(2) X2
Distributed Ambidexterity.	13	C; X1(2); X2(2) CC; HC; SC HC HC HC; PC HC; X1 PC; SC; X1(2) PC; SC(2); X1; X2 SC SC SC; X1 SC; X2; SC; X1; X2
Point Ambidexterity	4	HC(3); X2(2); X1(2) HC; PC HC; PC(2) SC
Self-Adjustment	4	CC; CI; PC; X1 HC PC; X2 SC(2)

**Table 36: Second-Cycle Coding Results: Multiple Codes**

<b>Theme</b>	<b>Quantity</b>	<b>Coded With</b>
Buffering Gap-Fill Integration Point Ambidexterity Role Expansion Set Tone;	1	CI; HC; PC; X2
Buffering Distributed Ambidexterity Set Tone	1	PC; X2(2)
Buffering Distributed Ambidexterity Integration Role Expansion Self-Adjustment	1	HC; SC(2)
Buffering Integration	3	CI; SC HC(2) HC; X2
Buffering Integration Self-Adjustment	1	HC; PC(2)
Buffering Point Ambidexterity	1	C; X1; PC
Buffering Point Ambidexterity Setting Tone	1	CC; SC; X2
Distributed Ambidexterity Integration	3	C(2); CC; X1; X2 C; HC; PC HC; PC; X1(2)
Distributed Ambidexterity Gap-Fill	1	HC
Distributed Ambidexterity Gap-Fill Integration	2	C; HC(2) HC; SC;
Distributed Ambidexterity Integration Point Ambidexterity	1	HC; SC(2)
Distributed Ambidexterity Point Ambidexterity	1	HC(2); PC(2)
Distributed Ambidexterity Self-Adjustment	2	HC; PC; SC; X1; X2 PC; SC
Gap-Fill Integration	2	CI; HC HC
Gap-Fill Integration Point Ambidexterity	1	HC(2); PC;
Gap-Fill Integration Set Tone	2	HC; PC; X1 PC(2); X1(3)
Gap Fill Integration Role Expansion	1	CI; HC; PC

Integration Point Ambidexterity	5	C; PC; SC C; SC HC(2) PC; X1 X1(2); X2
Integration Role Expansion	4	CC; HC; PC(2); X2(2); X1 CI; HC; SC; X1; X2(2) CI; X1 HC; SC
Integration Role Expansion Set Tone	1	C; CI; X1; X2(2)
Integration Point Ambidexterity Role Expansion	1	CI; SC; X1
Integration Set Tone	5	PC; SC; X2(2) C(2); X1; X2(4) HC; X2(2) HC(2); PC; X1 X1; X2;
Point Ambidexterity Role Expansion	1	CI; HC(3); PC
Self-Adjustment Set Tone	1	PC(2); X1(3); X2(2)

Representative examples of the quotes for each theme are given in Appendices E and F. As with the evidence presented from the first phase of interviews, some of these quotes are shortened from the fully coded transcript, and some of the context is necessarily reduced. Further details of each case and each respondent (including details of the coding of each individual's interview) are given in Appendix D.

#### 5.4.7 Multi-Element Interaction

As highlighted from Table 36 and in the quotes in Appendix F, the ideas developed in the model of Figure 68 are not stand-alone, but interact heavily with each other as the micro-mechanisms enabling ambidexterity. As with the interactions of the intellectual capital and exploration / exploitation developed from Phase 1 of the research, this also shows complex patterns of interconnectivity. This can be understood holistically, in that the managerial response to complexity, critical incidents and constraints can be understood by the pattern of practices. Combining the exploitative and exploratory actions of others into project-level ambidexterity by buffering, gap-filling, integration and tone-setting makes sense as a package of practices. Each can be understood and identified separately, but they are effective as a set of tools that can be applied jointly to help achieve the project goals. Indeed, a reductionist approach may limit the understanding of what is actually happening.

A similar argument may be applied to the coding of the intellectual capital and exploitation / exploration with regards to their contribution to the elements identified. No straightforward relationships were identified whereby practices could be understood as consisting of a simple 'recipe'. The managerial role is a complicated and ongoing response to complexity whereby multiple elements are utilised in a flexible range of combinations to achieve the project objectives.

## 5.5 Unpacking the Findings

The model of Figure 68 shows the arrangement of drivers and micro-mechanisms of ambidexterity, and the coding results of Table 35 and Table 36 indicate the relationships between the multiple elements within it. As indicated earlier, the themes were developed through considering the cases, then the second-cycle coding identified those elements within the text, together with the co-occurrence of other codes.

Whilst a quantitative analysis is not intended, it is insightful to note occurrences of the coding elements. Of the five (singly-identified) managerial practices captured back in the coding of Table 34, 'integration' appears the most often (29), followed by 'setting the tone' (15), then 'buffering' (11). In terms of configuration, distributed ambidexterity appears significantly more often than 'point ambidexterity' or 'self-adjustment'.

Referring also back to the coding data in Table 34, it is interesting to examine the most prevalent codes in light of the subsequent analysis to gain a sense of the key drivers of Figure 68. Again, this is not intended as a quantitative analysis and so the numerical occurrences are not necessarily an indication of importance, but it is noteworthy nonetheless. The most common *complexity* is structural (76 instances), which may not be surprising given the IT-nature of the projects, and the corresponding technical challenges. This is followed by socio-political complexity, again this is understandable given the client / provider nature of each of the cases.

Under *exploitation*, the most common code (by a factor of two) was the use of 'robust processes' (103 instances), and this corresponds to the highest PC code of standard procedures (90 instances). These were the two highest-occurring codes of all, indicating the strong influence of process and control as both inputs to the project and as key enablers of execution, and were also the only two codes associated with all 26 respondents. This is supported by the *exploration* aspects, with 'innovation and flexibility' and 'process flexibility' scoring 65 and 70 respectively, along with 'flexible systems' in PC (58 instances). This shows the strong influence of project capital, and the importance of both the mechanistic and organic aspects.

The significance of *social capital* came through with '(in)formal communications' and 'relationships and ties' dominating (79 and 69 instances respectively). By far the most prevalent of the managerial practices was 'integration' (again, by a factor of two), highlighting its significance as a primary micro-mechanism underlying project ambidexterity.

Although there is no 'recipe' from Table 35 and Table 36 to enable simple instructions on the management of ambidexterity, some observations may be made regarding the influence of the inputs to the practices given the data that has been gathered:

1. *Distributed ambidexterity* appears to be primarily associated with HC and SC, hinting that the expertise may be exercised using social mechanisms more than organisational processes, despite the significance of PC in the overall coding results.
2. *Point ambidexterity* is associated more with HC and PC, perhaps indicating that it is dependent upon the individual's experience and knowledge, and their ability to draw on and use the project capital to best effect.

3. Although there are a relatively low number of incidents of *self-adjustment* within the coding, no clear pattern of links to underlying IC elements is apparent.
4. There is not a consistent coding of IC for *buffering*, with HC, SC and PC all represented.
5. *Gap-filling* appears to be associated with HC, indicating that it may be the knowledge within the manager enables this to be performed. However, there are a low number of instances of the coding either singly or in association with other themes, and this must be taken into account when inferring conclusions from the data.
6. *Integration* is a prevalent theme, and associated with many IC codes. There is not a consistent coding behind the concept, with HC, SC, PC, exploitation and exploration well represented. Integration is also associated with other themes, again indicating its importance in the generation of project-level ambidexterity.
7. *Role expansion* is associated with multiple IC codes, with none dominant. There is a strong link (unsurprisingly) with the 'critical incident' code, but this is not always present, indicating that the effect can be identified with smaller events.
8. There is a range of IC elements coded with *setting the tone*. PC and exploitation / exploration appear prevalent, perhaps indicating a link to processes and practices.

By considering the co-occurrences of these configurations and practices, it is apparent that there are few simple patterns to relate the managerial practices to the underlying intellectual capital sub-elements. There is a complicated arrangement of interrelationships between intellectual capital, exploitation and exploration, and the actions and configurations identified. By considering the micro-mechanisms highlighted in Figure 68, the coding results indicate the following:

1. They can be considered independently of each other, and each can be identified separately.
2. However, there can be significant interaction between the elements, and multiple instances of this coding took place in the analysis.
3. The configuration aspects and micro-mechanisms do not have consistent association with the sub-elements of the 'context' (IC, complexity, constraints and critical incidents).

The coding indicates that the concepts of ambidextrous configurations and the managerial practices are not straightforward in terms of their drivers, but that they are significantly intertwined with the elements used in the Phase 1 research and analysis in the delivery of project outcomes. The evidence shows how difficult it is to disentangle these aspects, and that an understanding of their application requires a consideration of all aspects in terms of how they can, and do, interact. This holistic approach is required to understand the orchestration of ambidexterity at the project level, and a reductionist approach, looking at the elements as separate aspects, is insufficient to appreciate the nature of their complex interplay.

### 5.5.1 Additional Findings from the Cases

A significant aspect of the case analysis was that the sampling criteria used were intended to provide a robust method of comparing higher / lower complexity and smooth / uneven patterns of performance (back in Figure 50). Access to a range of projects within the organisation enabled this sampling to be achieved, and yet the findings did not correspond to expectations in this respect. The Company data

(despite being extensive) masked much of the practical complexity 'on the ground'. Support projects tracked by expenditure were classified as relatively straightforward at the organisational level, yet the actual work could contain extensive change projects for the customer under the guise of that 'support'. The initial complexity assessment was therefore not necessarily supported by the case data obtained from the interviews. Similarly, the initial performance assessments based on Company data were insufficient to capture the complexity of the reality of the work, especially where several ongoing projects were 'hidden' under a single set of data showing expenditure.

For these reasons, primacy was given to the interview data and the detailed lived reality of the individuals involved, and the actions they took to progress their projects under the complex conditions they encountered.

## 6. CHAPTER 6 - SUMMARY, DISCUSSION AND CONCLUSIONS

This chapter summarises the findings and contributions of the work.

Project management processes offer the capability to better govern and refine project work, yet this should be balanced with the novelty and problem-solving that is required with each undertaking. In the terminology of March (1991), this therefore involves both exploitation (knowledge refinement) and exploration (knowledge generation), which was examined in terms of ambidexterity.

A systematic review was performed to identify theoretical and empirical gaps in the ambidexterity literature. This highlighted an under-theorisation of ambidexterity in complicated organisational structures (Benner and Tushman, 2003; Gupta et al., 2006), and a lack of empirical (especially qualitative) data at the individual manager level to understand the practices by which ambidexterity is generated at the organisational level. The research model was generated based on an *input-process-output* structure, and previous supporting literature examined, together with identified gaps.

Previous I-P-O studies were examined, but these did not offer a coherent structure to address the ‘how’ question. Various forms of ‘input’ have been utilised in the literature, but these lacked a focus on the nature and utilisation of the *resources* as inputs and the *practices* by which ambidexterity could be enabled. Resources in this study were identified in terms of knowledge assets, specifically intellectual capital, using the manager as the unit of analysis.

Additionally, the output measures in previous studies were financial and business performance metrics and, as shown in the literature review, this can be inappropriate in the project context, since ‘success’ has a range of interpretations, and can vary depending upon an individual’s perspective. However, the ‘output’ function enabled case study selection since extensive performance data was available on a range of projects, allowing purposive sampling.

The research question posed was:

***RQ: ‘How is ambidexterity achieved at the level of the project?’***

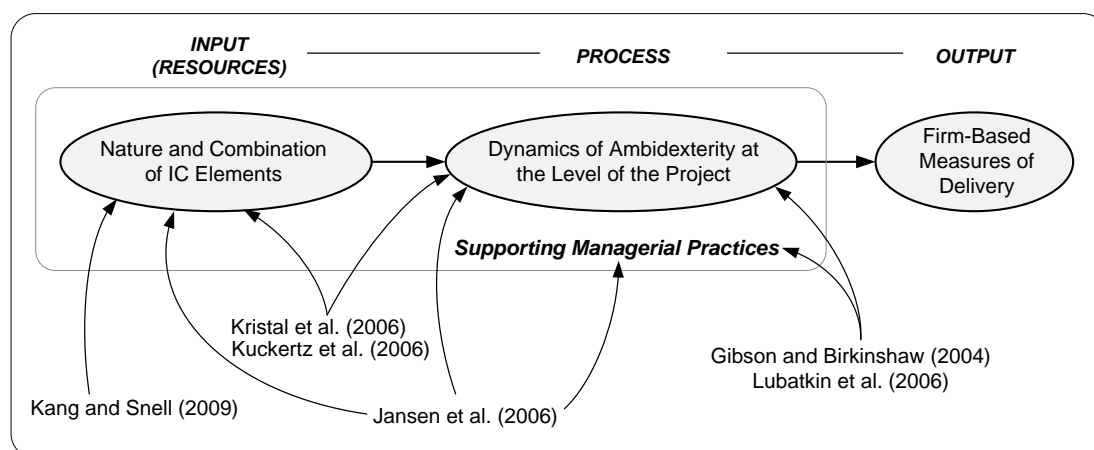
This involved 3 Sub-research questions:

***Sub-RQ1: ‘How are the different forms of Intellectual Capital used as inputs?’***

***Sub-RQ2: ‘How do exploitation and exploration occur at the level of the project?’***

***Sub-RQ3: ‘What management practices support the orchestration of ambidexterity?’***

These build on key papers from the I-P-O literature, and their links to the research model are repeated in Figure 69.



**Figure 69: I-P-O Research Model and Previous Literature**

Research was undertaken in two phases, within a large global IT-services organisation. The first phase of the work investigated the nature of the intellectual capital inputs and exploitation / exploration at the project level using the manager as the unit of analysis (Sub-RQs 1 and 2). This highlighted the orthogonal nature of intellectual capital, and the interwoven nature of the IC resources with exploitation and exploration at the level of the project.

Phase 2 used eight case studies, selected in terms of project performance and complexity, to seek the managerial practices enabling ambidexterity (Sub-RQ3). Using between 3 and 5 managerial respondents per project, underlying practices and configurations were identified.

## 6.1 Findings in Light of the Literature

From the literature review, Table 14 was derived earlier to identify gaps within the established ambidexterity I-P-O literature (see also Figure 69, above). Brief responses to each of these are summarised in Table 37.

**Table 37: Findings in Light of Previous I-P-O Research**

<i><b>Paper</b></i>	<i><b>Further Work Suggested</b></i>	<i><b>Contribution</b></i>
Gibson and Birkinshaw (2004)	Managerial behaviours and practices used in the creation of ambidexterity.	Practices and configurations identified that support project-level ambidexterity. This was the purpose of Sub-RQ3 and described in Chapter 5. The final model to address this is shown in Figure 72, below.
Jansen et al. (2006)	Study over time; greater investigation of social networks; exploitation and exploration under conditions of change.	The case studies of the Phase 2 research addressed the study over time, highlighting the importance of both exploitative and exploratory social capital, together with critical incidents encountered. Findings represented by Figure 71 and Figure 72.
Kristal et al. (2010)	Study over time; investigation of relationships in supply network.	The case studies of the Phase 2 research addressed the study over time. Each project was in a supply network with both a customer and its own



		suppliers. The significance of effective formal and informal relationships to sustain the supply network was highlighted in both research phases in terms of social capital.
Kuckertz et al. (2010)	Mechanisms of interactions behind exploitation and exploration. Ambidexterity under dynamic conditions.	The mechanisms were addressed as Sub-RQs 1 and 2, and the Phase 1 results (see Figure 71) indicate the complexity of the operation from the viewpoint of intellectual capital. The qualitative analysis concurs with Farjoun (2010) in that exploitation and exploration can be considered as a duality. Ambidexterity under dynamic conditions explored by the case studies, findings shown in Figure 72.
Lubatkin et al. (2006)	Role of management team over time in influencing ambidexterity; Ambidexterity in a complicated environment.	The role of the management team over time was explored by the case studies. Findings indicated the five specific practices, together with different configurations to influence ambidexterity at the project level (Figure 72).

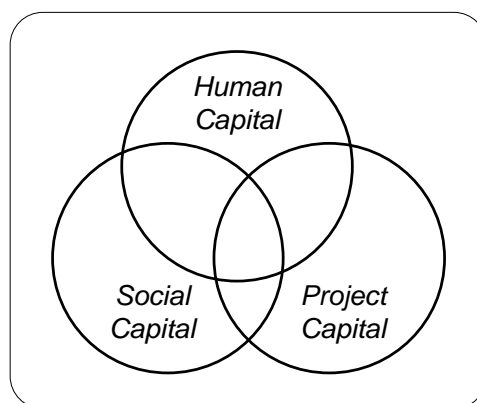
These issues are now discussed in terms of the Sub-RQs that were developed.

### 6.1.1 Phase 1, Sub-RQ 1 – Intellectual Capital Inputs

Lubatkin et al. (2006:668) (above) ask “whether higher performance is sustainable in the face of changing competitive challenges, coupled with limited resources and the inherent difficulties in reconciling differing risk preferences, repertoires, and competencies within the same firm.” The literature to date has focused mainly at the organisation-, firm- or business-unit level, with a lack of research at the level of the sub-unit which may be coupled with others in complicated and evolving ways. This was highlighted by authors including Benner and Tushman (2003) and Gupta et al. (2006).

A key aspect of the ‘input’ theorisation was based upon the conception of this complicated structure, with multiple heterogeneous elements, rather than the ‘simpler’ models of structural or contextual ambidexterity. It was this context in which the nature and combination of the input resources (specifically, the IC elements) were investigated, following the I-P-O literature of Jansen et al. (2006), Kristal et al. (2010) and Kuckertz et al. (2010) (Figure 69).

The theoretical basis for conceiving intellectual capital elements as orthogonal with regard to ambidexterity (Cao et al., 2009; Gupta et al., 2006; He and Wong, 2004) was developed and tested in the field of the management of projects. Using semi-structured interviews with 16 managers in projects, analysis of the data showed that, in terms of the Kang and Snell (2009) model, human, social and project capital were indeed identified in both exploitative and exploratory forms. Further analysis showed more complex effects, in that although elements could be identified, so also could their interactions. This is represented in Figure 70, showing the IC inputs and their (highly simplified) interaction with each other.



**Figure 70: Interaction of IC Inputs**

The PM function involves managing the project team, dealing with suppliers, communicating with senior management, and (in these cases, since the research company were suppliers to the client organisations) the customer. This captures the 'messy', convoluted, reality of organisational life at the task level, which is complicated and uncertain. Because of this, care must be taken with the intellectual capital model, in that further detail of the contents of each element must be considered if it is to be used for analysis. For instance, there were several examples of the PM being supported by a technical manager whose role was to provide that detailed technical expertise, so the PM's specialisation (exploitative HC) would therefore be towards project management rather than the minutiae of the particular IT system. The existence of 'exploitative HC' is therefore not necessarily a simple question, there are further subcategories below it that may need to be covered for a particular context, and these may be located within one or more individuals. Further context-specific sub-categorisation of the intellectual capital elements may be a powerful analysis tool (as demonstrated by the coding scheme for the Phase 2 interview analysis, which was derived from the first set of interviews together with extant literature).

Although this work demonstrated a useful framework for understanding the resource inputs, it also demonstrated their interaction and the fact that to consider any of the elements in the absence of the others misses a key aspect of the operationalisation. HC, SC and PC can be understood as stand-alone elements in theory, but in reality they are difficult to disentangle from each other. This finding overlapped with Sub-RQ 2 as part of the Phase 1 research, and was a key insight gained from the qualitative approach.

Interestingly, other roles within the case studies did not necessarily demonstrate all six elements. The PMO managers tended to be more exploitative, as did some of the managers reporting to the PM. The consideration of IC in terms of orthogonal elements is a powerful lens through which to understand project operations, but this needs to be tempered with an understanding of how multiple roles interact and the context in which it is operating.

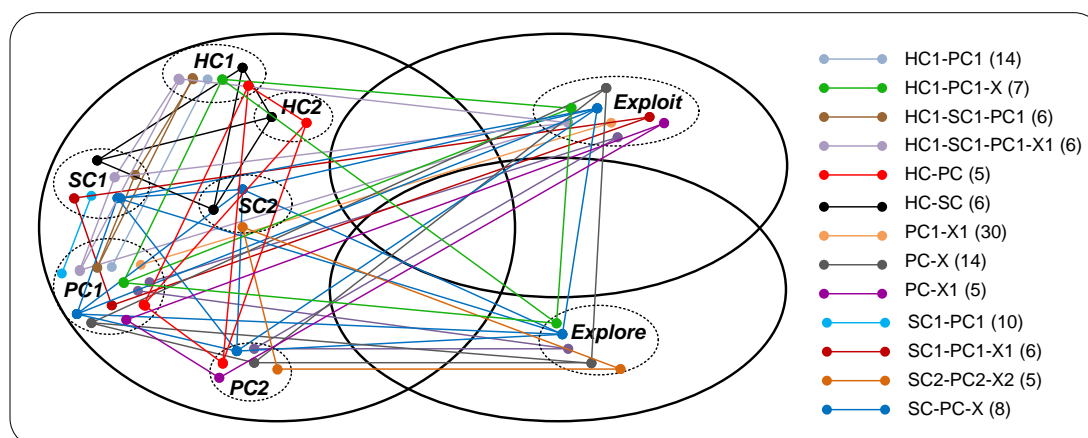
In summary, this work has further expanded our understanding of the inputs of the I-P-O model of ambidexterity, in line with the recommendations of Kristal et al. (2010), Kuckertz et al. (2010) and Jansen et al. (2006).

### 6.1.2 Phase 1, Sub-RQ 2 – Exploitation and Exploration at the Level of the Project

Further investigation of the dynamics of ambidexterity has been advocated by previous I-P-O studies (Gibson and Birkinshaw, 2004; Jansen et al., 2006; Kristal et al., 2010; Kuckertz et al., 2010; Lubatkin et al., 2006), and this research has contributed to that call.

Coding of the data showed complicated patterns of interaction identified between exploitative and exploratory intellectual capital, interwoven with the processes of exploitation and exploration. This is indicated in Figure 71 for the most highly coded elements, where HC/SC/PC “1” is exploitative IC and “2” is exploratory. This demonstrated the difficulty of trying to assess the ‘how’ of ambidexterity, and the qualitative approach revealed the multiple, intricate, relationships between the elements.

From Sub-RQ 1, therefore, this shows how all six IC aspects can be used as inputs. They are strongly intertwined with each other, but disentangling the input resources from the processes of exploitation and exploration is difficult. Figure 71 therefore highlights that exploitation (‘knowledge refinement’) and exploration (‘knowledge generation’) exist together, but are enabled by the IC. As highlighted in Chapter 4, the process elements were tightly bound with the IC (especially the PC), and to conceive of them as ‘stand-alone’ neglects their drivers and mutual interaction. Another key finding from the qualitative data was that whilst the ‘end-points’ of exploitation and exploration are theoretically well-conceived, at ‘low levels’ of each they are hard to distinguish. This supports Farjoun’s (2010) argument that they should be considered as a *dualism*, in this context interwoven throughout the duration of the project.



**Figure 71: Phase 1 Results of IC and Exploitation / Exploration**

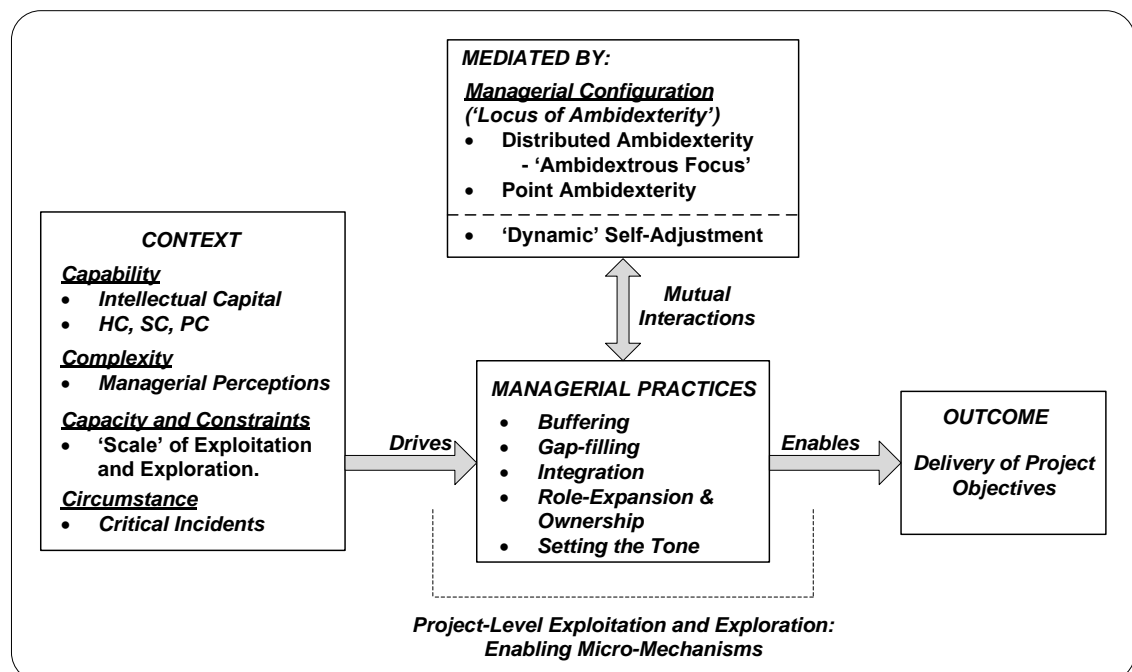
As part of this analysis, key aspects of exploitation and exploration were identified using previous instruments and from examining the Phase 1 interviews. Mechanisms for exploitation were *change control*, *regular client feedback*, *knowledge-sharing*, *learning from experience*, *agreement of objectives* and *robust processes*. For exploration, these were *developing relationships*, *innovation and flexibility*, *delivery of long-term client benefit*, *new ways to satisfy the client*, *planning to accommodate problems*, and *process flexibility*. These were detailed back in Table 24 and give greater clarity to the ‘umbrella’ concepts of exploitation and exploration in the context of managing projects.

### 6.1.3 Phase 2, Sub-RQ 3 – Management Practices and Orchestration

Previous studies taking an I-P-O approach have highlighted the need to better understand the practices by which ambidexterity is influenced (Gibson and Birkinshaw, 2004; Jansen et al., 2006; Kuckertz et al., 2010; Lubatkin et al., 2006). Whilst the role of managers has been highlighted within the ambidexterity literature, this is primarily in the context of structural integration of separate exploitative and exploratory elements. There has been little qualitative work addressing the ‘how’ of orchestrating ambidexterity at the organisational (in this study, the project) level.

Phase 2 of the research built upon these results and used eight case studies to further explore the deployment of intellectual capital over the duration of different projects. These projects were from multiple industries, and were chosen based on data showing their ‘complexity’ and ‘pattern of performance’. The performance aspects drew upon the ‘output’ from the I-P-O model as a selection criterion. From the case analyses, managerial practices enabling exploitation and exploration at the level of the project were identified. These were ‘buffering’, ‘gap-filling’, ‘integration’, ‘role-expansion’ and ‘setting the tone’, as repeated in Figure 72, addressing Sub-RQ 3.

From the project management perspective, this adds to the empirical evidence of how PM practices can lead to delivery outcomes (Kloppenborg and Opfer, 2002; Scott-Young and Samson, 2008). It is also in line with Antonacopoulou and Sheaffer's (2010:2) definition of practising as “*deliberate, habitual and spontaneous repetition* reflective of the dynamic process of becoming based on rehearsing, reviewing, refining, and changing practices and the relationships between them” (emphasis in original), as introduced in section 3.1.2.3.



**Figure 72: Phase 2 Model of Managing Project-Level Ambidexterity**

The case studies in the Phase 2 research also identified different ambidextrous configurations within the project structure. Building on the concept of structural ambidexterity (O'Reilly and Tushman, 2004) and contextual ambidexterity (Gibson and Birkinshaw, 2004), a ‘simple’ ambidextrous structure is not sufficient to explain

project-level exploitation and exploration. The idea of a 'locus of ambidexterity', including the concepts of 'distributed' and 'point' ambidexterity was developed. With the former, project-level ambidexterity can broadly be understood as the sum of multiple heterogeneous contributions. With the latter, key individuals can have a strong influence over project-level ambidexterity, yet these two concepts can co-exist. Additionally, individuals and teams can demonstrate self-adjustment of their exploitative and exploratory activities according to the project and task requirements, and this dynamic aspect at the micro-level is not highlighted in the literature. The qualitative research method showed more detail as to how ambidexterity may be understood and orchestrated in such complicated structures, a level of detail not addressed in previous empirical research.

A key finding from the case studies in Phase 2 was that in this complicated structure, the managers of projects did not share a consistent, single, view of 'the' project ambidexterity. Instead, each offered a personal perspective of the work in terms of their role and their view of the nature of the complexities and critical incidents they encountered. This was reflected in the practices they undertook. By using 3-5 respondents per project and qualitative analysis, a more detailed picture could be built up than by using a single respondent in addressing the 'how' of ambidexterity.

When comparing this to the existing literature, it is noteworthy that (as shown in the systematic review) the bulk of the empirical ambidexterity studies are from quantitative analysis of survey data based largely on a single respondent for the organisation. This is a well-established technique and the risks and benefits are well-documented. However, the evidence from this study shows that even when individuals in relatively small teams are co-located, they can have quite different perspectives, depending on their role. Caution is therefore warranted in using single-respondent studies in this area, since the 'dynamic' and 'practice' aspects of ambidexterity may be perceived quite differently from person to person.

In employing exploitation and exploration as a response to those complexities and incidents, the range of options were bounded by the constraints of the project, such as resource availability, customer or organisational process requirements, budget and so forth. This idea of *bounded ambidexterity* is not prevalent in the literature, and the concept of that boundary moving under critical incident conditions is an interesting finding from the interviews regarding the dynamics of ambidexterity.

#### 6.1.3.1 Temporal Issues

The temporal issue of ambidexterity and the requests for longitudinal studies (Jansen et al., 2006; Kristal et al., 2010; Lubatkin et al., 2006) have been partially addressed here. Although these were not full longitudinal studies, the temporal element was inherent in the nature of the project work. Part of the research investigation was to seek evidence of the role of ambidexterity at the beginning / middle / end of the project and look for consistent themes amongst the cases.

Interestingly, there was no strong evidence that there were any regular patterns amongst the cases. Whilst temporal ambidexterity theory (Simsek et al., 2009; Tushman and O'Reilly, 1996;) indicates that organisations can switch between exploitative and exploratory modes over time, there were no clear indications of these patterns occurring from these studies. It should be noted that the projects studied covered a range of start-up / close-down conditions. Some projects were performed by a relatively fixed team providing ongoing support and implementing specific projects as part of that function, whereas others were the more 'classical'

approach of staff coming together, performing the work, and then disbanding. However, no consistent temporal themes could be discerned. This was unexpected, since it might be anticipated that a project would move from a more exploratory mode to a more exploitative one as the project progressed. From my personal experience in R&D / product development experience I would have expected to find this, but it did not come through from the evidence of the cases used.

#### 6.1.4 Summary of Findings

Together, these results can be viewed in light of the research model to show how the model, Sub-RQs and findings can be understood (Figure 73).

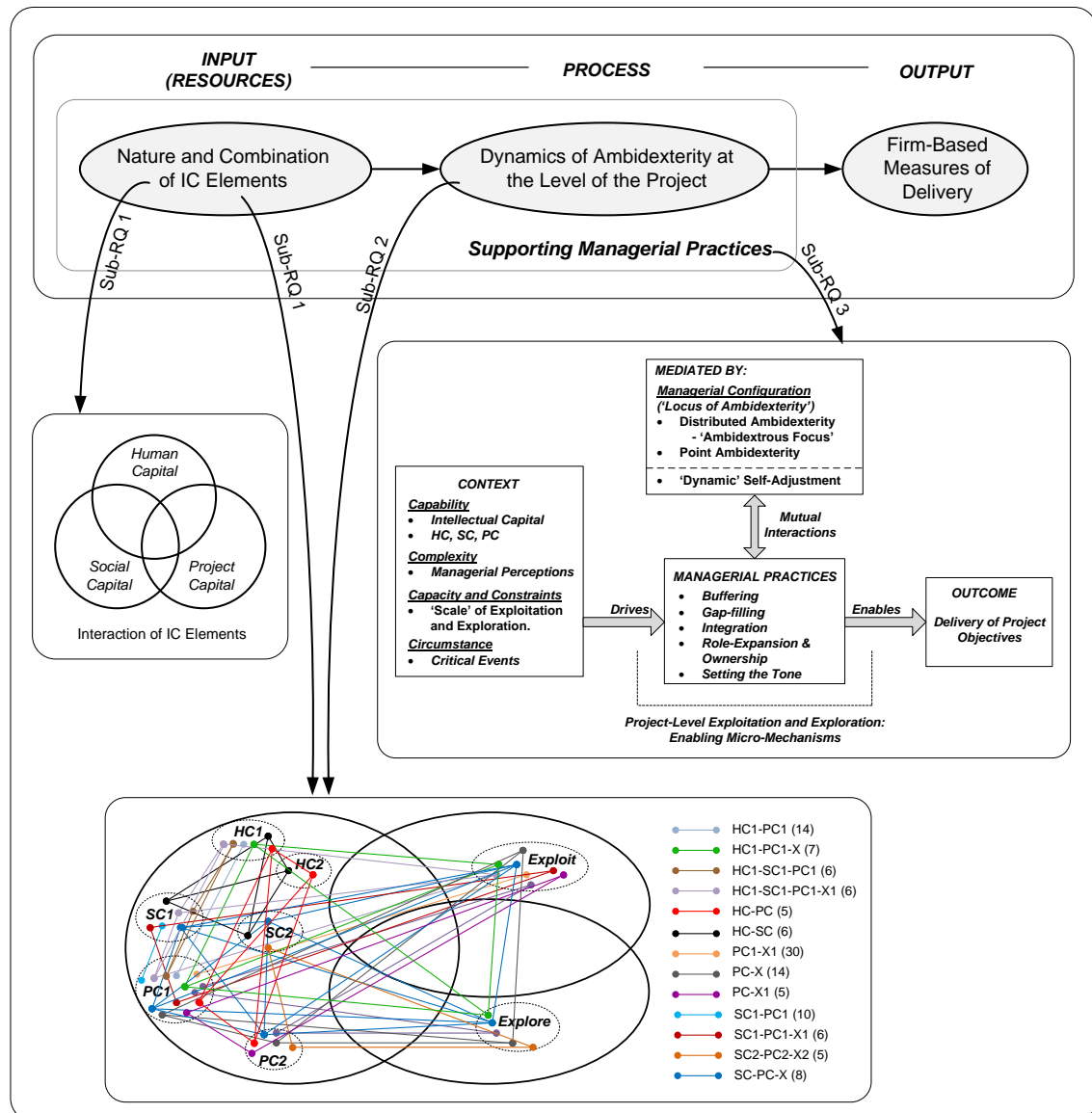


Figure 73: Research Model and Links to Findings

#### 6.2 Discussion, Limitations of the Study and Future Work

This research was undertaken to generate a better understanding of the 'how' of ambidexterity. The results show that a 'simple' conception is not warranted, since the research has highlighted the complicated interactions that underpin ambidexterity at the level of the project. Using the manager as the unit of analysis

has identified the practices and configurations that occur under conditions of complexity and constraint.

The input-process-output framework was based on the findings from the literature review, and this has been powerful in allowing a detailed examination of inputs (namely the intellectual capital resources), the interrelation with the process elements and the supporting practices. As shown with the project management literature review, the link between 'process' and 'output' is poorly understood, and hence the focus was in the earlier stages of the model, using performance as a case selection factor. With these findings, however, a more detailed examination of the process-output link can be performed (see Further Work, Point 1, below). As part of the analysis of the case data, I looked for examples of poor project performance as a consequence of one or more of the six IC elements being absent (i.e. a lack of one of the aspects therefore being associated with reduced performance). However, within each case the managers demonstrated the six elements and there were no identifiable 'gaps'. This is not to say that this could not be tested further with a more detailed version of the '6-box' IC model. As shown in the Phase 2 coding analysis, the intellectual capital elements can have a number of sub-components, as can the processes of exploitation and exploration. Whilst it is beyond the scope of this work to investigate this further, detailed context-specific facets of each aspect may be identifiable and valuable as an aid to performance, in which case any absences that may lead to poor performance can be noted.

The aspect that came through strongly in both phases of the research was that of the manager as an 'integrator'. Although this is in line with previous literature (e.g. Barker, 2010), the interplay of the six intellectual capital elements provides a different perspective. The role of specialist and generalist HC show the knowledge that should be in place to achieve this, together with the multiple facets of SC. Extensive communication is key, building and maintain relationships amongst a range of stakeholders, and 'getting things done' can require both a formal and an informal approach to acquiring and disseminating project knowledge. Finally, the use of both (mechanistic) explicit tools and processes, together with the organic flexibility to respond to immediate issues provide the framework in which this can occur. This provides a conception of how the managerial role can integrate exploitation and exploration. Importantly, however, this is not an easy task, and requires skill on the part of the manager. The qualitative nature of the research has brought this out, and it supports the previous research findings of the value of intangible project management assets (Jugdev, 2004; Jugdev et al., 2007).

The limitations of this work are that it focuses on industrial IT-service provision in terms of the range of projects, and it is accepted that other project management contexts (such as construction or new consumer product development) may offer different results. The use of a single organisation is also a limitation in that there may be Company-specific issues that do not occur elsewhere, although the use of multiple industrial environments mitigates this risk. Finally, the use of a single researcher for qualitative research may introduce bias into the findings. My own experience as a project manager may also have brought my personal perspectives into the analysis, but by using previous literature where possible in the work and deliberately reflecting on my own biases, I attempted to keep this to a minimum.

This work has opened up a number of areas where it could valuably be continued:

1. As discussed in the development of the research model, the link between exploitation and exploration at the level of the project and the 'outcomes' is poorly understood (although the 'output' performance data provided suitable

case study sampling criteria). However, now that managerial practices and configurations have been identified, that linkage may be better explored. Quantitative analysis of a wide range of projects, identified elements of exploitation and exploration, specific managerial practices and a range of outcome measurements may lead to a greater understanding of the links between key practices and performance outcomes.

2. The role of complexity (Geraldi et al., 2011b) was useful both as a case sampling criterion and also in the interviews as a way of discussing project issues. Although it was not part of the research question, the subject of how ambidexterity can be used as a response to project complexity may be useful further research.
3. The Kang and Snell (2009) model can be used as a high-level template to investigate the detailed aspects that are required in various industrial contexts. For example, further detail on *which* specialist skills, social capital characteristics and so forth are suitable in particular roles would not only be valuable research, but may provide a powerful analysis tool. This may also be suitable for survey-based quantitative analysis. Additionally, by building on specific competence analysis (for example Partington et al., 2005 in the field of programme management), this may lead to a better understanding of the suitability of individuals for specific roles. Note that this is not limited to project / programme management, but could apply to a wide range of fields where ambidexterity may be identified as valuable.
4. The work may be expanded to further investigate the benefits of ambidexterity in the practices of managers. Both exploitation and exploration have been identified, yet further study may identify examples of the mis-orchestration of ambidexterity (for example, too little / too much exploitation / exploration). This may best be examined in a full longitudinal analysis, where data is captured throughout the work along with the managerial perceptions at the time, allowing reflection immediately after the event. This may further aid in the understanding of knowledge refinement and knowledge creation in this context, and how decisions might have been improved in light of the outcome.
5. This study has been performed at the level of the project, and a natural extension would be to perform analyses at the level of a much larger *programme* (using the distinctions argued by Pellegrinelli, 2011) to understand how exploitation and exploration can be understood, identified and managed at this higher level. The role of the programme manager and the senior team would be valuable in leading to a greater understanding of ambidexterity.
6. By considering the details of the cases, the structural ambidexterity argument can be slightly reconsidered. The role of the manager in these projects is to deliver the project outcomes, which generally involves some degree of novelty, yet this is often achieved using exploitative techniques and technologies. We can therefore consider that ambidexterity embodied within the manager may lead to project-level exploration by the combination of exploitative elements (an example of this was Case 5 when much of the software development was performed by an agile team that were remote from the project delivery itself). The management of more exploitative technical staff and existing solutions can generate novel outcomes, in the same way that standard materials may be used to build a radical building. This was not part of the research plan and is an emergent concept, but may be worthy of further investigation in the future.



### 6.3 Contribution to Knowledge

This work has added two contributions to knowledge.

Firstly, Phase 1 of the qualitative research looked at the nature of the managerial resources in terms of intellectual capital. By considering ambidexterity as orthogonal, six elements were identified (human, social and organisational / project capital, each in exploitative and exploratory form), an extension to existing theory. Analysis of the interview evidence furthermore showed that significant inter-linkages could be found, and to consider an IC element on its own neglected the others that enabled its utilisation. The IC resources were considered as the '*input*' to the '*processes*' of exploitation and exploration. Qualitative analysis of exploitation and exploration, however, identified that these were significantly intertwined, and disentangling the constructs, especially at low levels of either, was challenging and counterproductive. This indicated the *duality* of the two ideas. The coding of the data also showed that the *inputs* and *processes* were themselves heavily interwoven, and to try and identify them separately would miss the nature of their operation. The complexity of their interaction is therefore a step forward in our understanding of the nature of managerial ambidexterity in this context.

Secondly, the use of multiple managerial respondents in eight case studies has highlighted the micro-mechanisms by which managers can orchestrate project-level ambidexterity. Considering the forms of project complexity, the nature of constraints and the impact of critical incidents, five managerial practices were identified that are used in conjunction with the intellectual capital resources to enable project-level ambidexterity:

1. '*Buffering*' – the manager acting to prevent unwarranted distractions affecting team performance.
2. '*Gap-Filling*' – performing necessary tasks not otherwise being undertaken.
3. '*Integration*' – actively bringing together the knowledge within the project to create a coherent whole.
4. '*Role-Expansion*' – the response to specific or critical incidents when exploitative and exploratory activity increases to deal with the situation.
5. '*Setting the Tone*' – enabling an environment where exploitation and exploration are supported.

Considering the managerial configuration as part of this showed two key forms:

1. '*Distributed Ambidexterity*': the pattern of exploitative and exploratory practices amongst a group of individuals, the sum of which provides exploitation and exploration at the level of the project.
2. '*Point Ambidexterity*': an individual who is a significant actor in creating group- or project-level ambidexterity, performing or coordinating both exploitative and exploratory activities that are not replicated by other individuals.

These findings add to our understanding of how ambidexterity is orchestrated at the micro-level, an area that has not featured prevalently in the literature. The identification of these practices and configurations adds to our knowledge of the '*how*' of the subject.

## 6.4 Implications for Practice

This research has sought to better explain practice by unpacking the actions of managers in terms of exploitation and exploration. In so doing, a better understanding of the micro-mechanisms has been developed. This does not lend itself to, for example, a straightforward set of recommendations, but it is valuable for managers nonetheless.

Considering the project execution as a learning experience (Edmondson, 2008) where knowledge refinement and knowledge creation are inherent to the work offers a significantly different perspective from a 'linear' execution model which assumes that the initial project plan is correct and incorporates the knowledge required. To approach the management of a project with a view to establish *what needs to be learned* is a powerful approach and one that is not often advocated in practitioner literature.

This research is beneficial as material for Masters students who can use it to reflect on their own practice. Opening up the discussion of ambidexterity itself acts as a re-framing of the project and offers an alternative lens through which to view the work. I have used this research for teaching and discussion with post-experience MSc students and it has been very effective (though it may not be suitable for pre-experience groups). Awareness of the concepts of, and benefits from, ambidexterity is useful, but to date there has been less evidence of the 'how'. Coming from a practice background myself, the 'how' is important in terms of understanding the practical implementation and therefore the route to the realisation of those benefits. The ideas of the intellectual capital model and the final management model (Figure 72, above) offer the frameworks via which managers can analyse their projects and their practice to identify how both may be understood and improved. The importance of the social capital aspects should be highlighted, as this can be under-emphasised in a subject where prominence is frequently given to tools and techniques. It also builds on the idea of a 'T-shaped' manager to show that other facets can be incorporated. The horizontal part of the 'T' is the generalist knowledge, the vertical is the specialist aspect, and this work has enabled further detail to be understood on both of these. A more fine-grained understanding of these managerial aspects potentially allows a better allocation of managers to specific projects. A reductionist approach is, though, not necessarily helpful, a holistic appreciation of the work is preferable so that managers can reflect on the work and consider their own actions in light of the research. Initial feedback from practitioners within the research organisation has been favourable.

## 6.5 Personal Reflection

This has been a tremendous personal journey as part of a mid-career change from an engineering project manager in a large multinational to an academic in a business school. Having completed my MBA successfully, I did not want that aspect of my life to 'stop' with that graduation, but felt the need to pursue a PhD to gain that next step in the study of the subject. As soon as I started the doctoral training programme, though, I realised what a significant step that is, and that the level of thinking, analysis and argument is just so much more demanding. Poorly-argued phrases, inadequate definitions, inconsistent language and less-than-rigorous writing was summarily dismissed and sent back for improvement. Luckily I had the privilege of working with others in a similar position so my troubles could at least be shared.

At the start, speaking to current students, most said it took at least a year to narrow their field of study and to find their research question. Naïvely, I thought that being older and coming from a practice background, I could improve on this. Of course, that was not to be, and I went down the same blind alleys of investigation as others in attempting to make sense of the enormity of the literature and struggled to identify where my contribution could be. Experience in other fields does not greatly help with coming to terms with the process of academe and this is both a great challenge and a frustration for anyone entering from a previous role. The learning curve was steep but hugely enjoyable, as I moved from a job of 'doing' where I did not seemingly learn too much over the course of each year, to a daily challenge of incorporating new knowledge into my rapidly-expanding jumble of loosely-coupled thoughts. Most engineering roles do not require you to justify the philosophical basis of your work, so the range of my reading was expanded enormously, along with the level of my thinking. Having recently re-read the MBA work I struggled so hard to complete, it now seems simple and weak – so that's probably a good sign.

The research itself was an area I feel strongly about. There is a tendency within some of the project management community and practitioner literature to emphasise the controls and tools that should be used, and to downplay the softer skills that are instrumental in project delivery. My experience is that this work is very much a social activity, and that uncertainty and the requirement for knowledge creation is inherent in the nature of management. To assume that project managers should be able to plan their way through this complexity up-front and that day-one assumptions will hold is simply not the way the world works. Management is a curious blend of art and science, and I hope this work adds to our understanding on the eternal quest for greater knowledge.

Reflecting on the research findings and comparing to my previous job, I can see the parallels of the findings in my previous role, which gives me more inherent confidence in their validity. Interestingly, I can apply the findings backwards into my previous organisation, but I would not have generated the final model from only that experience. From this I infer that the wider range of case studies served their purpose of providing a broader set of data from which to draw conclusions.

As with all successful education, the learning should inspire the search for greater understanding. Rather than providing all the answers, these studies have highlighted to me how much more there is to know and discover. The journey continues. Thankyou for reading.

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## Appendix A – Systematic Review Protocol

The systematic review approach to the literature (Tranfield et al., 2003) has been developed from the field of medicine and provides a basis for systematically examining the existing literature in line with a pre-defined search and evaluation strategy. It should be “systematic, transparent, and reproducible” (Tranfield et al., 2003:209).

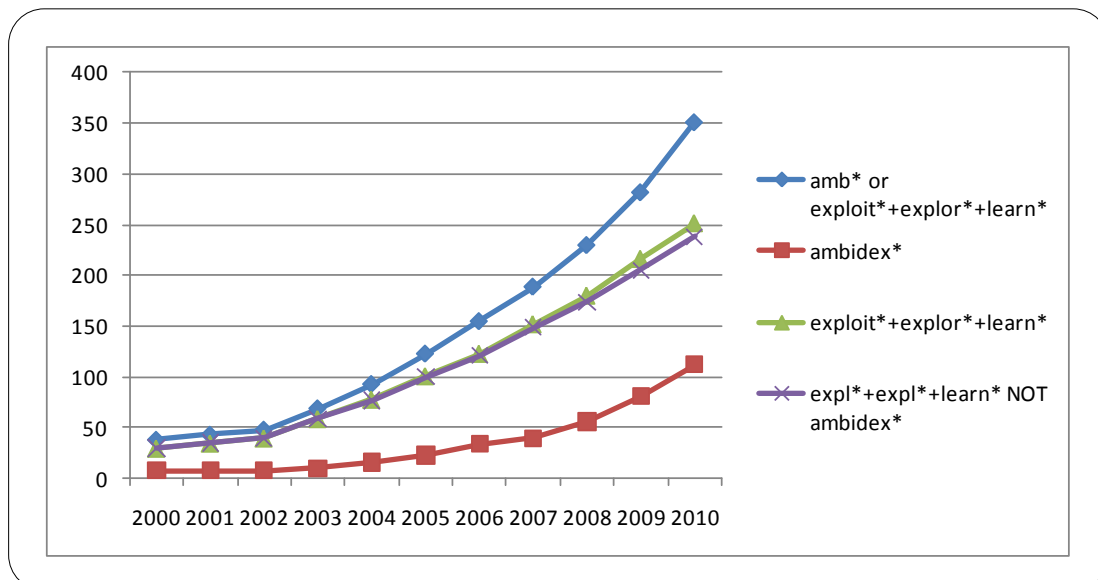
### Purpose and Search Question

The review question was proposed as:

***“What is known about ambidexterity in terms of theoretical conceptualisations, operationalised research and empirical findings?”***

### Strategy and Sources

The primary search databases were *ABI/Inform Proquest* and *EBSCO*.



**Figure A1: Terminology under investigation as part of search (data to end of 2010).**

- Review keyword: **“ambidex”**

### Review Process and Criteria

In order to reduce the literature to a manageable amount and provide traceability, specific inclusion and exclusion criteria are offered in terms of which evidence to pursue, and which to reject. This list also draws upon the work of Mollen (2007) and Doldor (2007).

**Table A1: Inclusion/Exclusion Criteria**

<b>INCLUSION CRITERIA</b>	<b>JUSTIFICATION</b>
Academic papers in peer-reviewed scholarly journals, working papers, conference papers, theses and dissertations. The star-rating of the journals is not at this stage an inclusion / exclusion factor, but the journal ranking may be noted in the analysis. Note: journals to be English-language only.	Journal papers are the primary academic resource on the given subject. Alternatively, theses and academic working papers may offer the latest thinking and research before publication.
No restrictions on industries or geographical areas of study.	Although this research is based on complex projects, ideas, methodologies and studies from other areas are likely to be valuable.
No restrictions on research traditions or type of study. Theoretical and empirical papers are both relevant.	All scholarly contributions considered as part of this review. Multiple and alternative concepts add to the richness of the analysis.
<b>EXCLUSION CRITERIA</b>	<b>JUSTIFICATION</b>
Working papers more than 4 years old at the time of analysis.	It anticipated that valuable studies prior to this date will have been subsequently published in appropriate academic journals.
Timeframe. Studies to be pursued from 2000 and beyond (see Figure A1).	Concentrate on the newer literature. Key papers from before that will be cited multiple times and can be analysed if deemed relevant.

The quality assessment is an important factor in this work, such that work is assessed prior to inclusion in the analysis. As such, the following factors are included for the assessment of empirical work. The criteria are valid for quantitative, qualitative and mixed-method work.

**Table A2: Empirical Paper Criteria**

<b>EMPIRICAL PAPER EVALUATION</b>
Are the aims and objectives of the research clearly stated?
Are the concepts based on a suitable theoretical foundation and a thorough literature review?
Is the research design and method specified in sufficient detail and appropriate given the research objective(s)?
Is sufficient detail provided of how the data was collected and analysed to support the conclusions offered?
Is sufficient data offered to justify the conclusions?
Is there overall consistency between the aims, methods, results and conclusions of the study?

Similarly, criteria were derived for conceptual papers:

**Table A3: Conceptual Paper Criteria**

<b>CONCEPTUAL PAPER EVALUATION</b>
Does the paper provide a clear and thorough literature review so that the work is positioned clearly in an existing body of knowledge?
To what extent does the paper make an original and scholarly contribution to the thinking in the specified field?
If a new model or theory is developed, how well is this developed from existing theory, and how significant is the contribution?
Is there sufficient discussion about the limitations of the work and the opportunities for further research?
Has the paper subsequently been cited as a seminal contribution by competent researchers in that tradition?

These criteria are utilised in line with the assessment tool in Table A4 (based on Doldor, 2007).

**Table A4: Quality Assessment Tool**

<b>CRITERIA</b>	<b>ASSESSMENT LEVEL</b>			<b>N/A</b>
	<b>LOW=1</b>	<b>MEDIUM=2</b>	<b>HIGH=3</b>	
<b>Theoretical Foundation</b>	Minimal information about the literature used. Low linkage to main theories in the field.	Reasonable awareness of the key contributions in the field and arguments well linked in the paper.	Complete review of the relevant literature. Makes clear use of existing theoretical arguments, compares them and assesses them in a rigorous and critical way.	N/A
<b>Method</b>	Inadequate explanations of the research design and methods chosen.	The link between the theoretical argument and the choice of the design is clear. Acceptable data analysis and interpretation.	Clear rationale for research design and strong link with the research question. Adequate sample and data analysis. Very accurate interpretation.	N/A
<b>Quality of Argument</b>	The arguments are not clearly stated and/or flawed. Unsupported generalisations; oversimplification of other ideas/theories.	The argument is reasonably convincing and incorporates core concepts of the theory presented.	The flow of the arguments is clear and persuasive. Arguments are well integrated into the existing theory. The conclusions are supported by thorough analysis and relevant examples.	N/A
<b>Contribution</b>	Little or no theoretical and methodological contribution to the field. Uses only existing ideas and methods	Contribution only on specific aspects – theoretical or methodological. Builds on existing knowledge.	Excellent quality and contribution at several levels. Clear contribution to existing knowledge by rigour and originality.	N/A

Additionally, though, the paper's relevance to the review question is of critical importance. To be valuable, it must make a contribution to the PhD research and inform the theoretical underpinning and/or the research design and analysis.

**Table A5: Relevance Assessment Tool**

CRITERIA	ASSESSMENT LEVEL		
	LOW=1	MEDIUM=2	HIGH=3
<b>Theoretical Contribution</b>	Of little use for the proposed research, aspects covered are of low relevance for PPM.	Contribution may be valuable, either directly or indirectly. Direct relevance may be unclear, but might contribute to the PPM field.	High relevance, clear and valuable contribution to the PPM context.
<b>Method and / or Analysis Contribution</b>	Research method and analysis not relevant for this line of enquiry.  If theoretical paper only, N/A score=0.	Offers options that may be valuable for either research design or analysis. Operationalisation of research question is worthy of consideration.	Clear benefits for research design and/or analysis. Benefits in operationalisation and outcome analysis that can be used in the research.

### Data Extraction

The following data extraction table was used for the systematic review:

**Table A6: Data Extraction Format**

INFORMATION	DETAIL
Paper Details	Title, Author, Journal Reference Consider journal star-rating.
Type	Empirical / Theoretical Quantitative / Qualitative Study
Details of Study	Industry, geographic location Nature of study, Research question, Main findings
Quality Criteria (Q1-4)	Overall Quality Scores (0-12)
Relevance Score (Q1-2)	Overall Relevance Score (1-6)
Include	Yes / No
Rationale for Inclusion / Exclusion.	

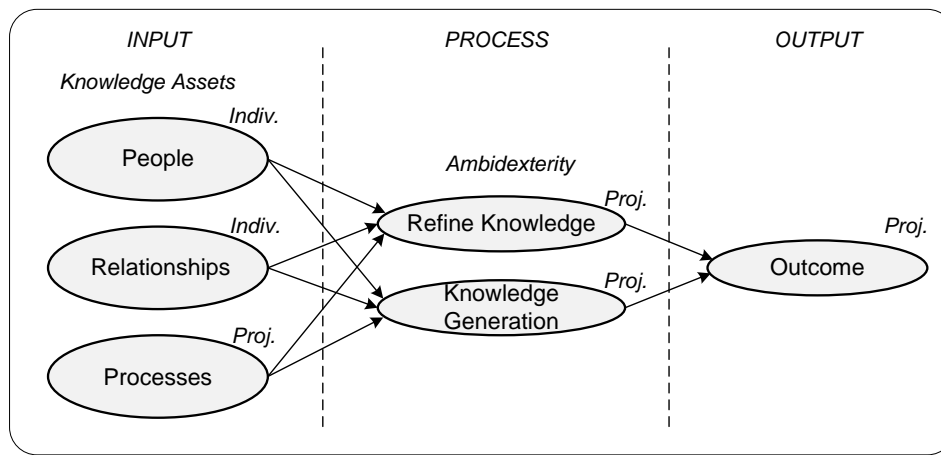


## **Appendix B – Phase 1 Interview Protocol**

- Name
- Role
- Experience
- Project description
- Phase of Project

**KNOWLEDGE** - Overview – looking at knowledge and learning within project organisations. Knowledge can generally be categorised in three areas – people, relationships, and processes.

Briefly explain diagram of research model.



- 1) People – Human Capital.
  - For your particular role, how do you see yourself in terms of specialist / generalist?
  - How important is your individual experience and knowledge?
- 2) Relationships – Social Capital. Networks, Trust and Common knowledge.
  - Can you tell me about the social relationships you have in this project?
  - What sort of communication approaches do you adopt? Formal, informal?
  - How important is interpersonal trust in this project? Can you give examples?
  - How important is common, shared knowledge in this project? Do you feel you generally have a good understanding of what's going on in the project, do you feel comfortable using the language of the project, or is it a collection of specialists whose knowledge has to be integrated? Can you give examples?
  - What about access to knowledge that is outside the boundary of the project?
  - Overall – more cooperative (strong ties) or entrepreneurial (weak ties)?
  - How important do you consider 'relationships' in your project at the moment?
- 3) Processes
  - Do you use detailed, rigorous processes in projects or do you take a more flexible approach to the work? Can you give examples?
  - Where is project knowledge stored?
  - Do you have a PMO? What does it do?
  - Would you say the project organisation is 'responsive'?
  - Overall – more mechanistic or organic?

- How important do you consider organisational processes in your project at the moment?

**LEARNING** - Overview – learning within projects can be one of two types – either *knowledge refinement (exploitative)*, incremental improvement, where you improve previous knowledge (updating processes and using them, etc., six sigma, lean, working with - or driving - industry standards) so you get better at what you do (incrementally improving products, serving a particular set of customers and acting on their feedback). Generally this would be planning thoroughly, executing to the plan, doing lessons-learned and so forth.

Alternatively, *knowledge generation (exploratory)*, where you innovate and find new approaches to the project, not necessarily relying on the standard processes. You are working to overcome knowledge absences, and you can apply flexible approaches to problem solving and look at multiple options, maybe adopting ideas from outside. This could be somewhat more adaptive, depending on the client's requirements, etc.

Can you give examples of *knowledge refinement* within your project?

- How important are each of these in contributing to project delivery?

Can you give examples of *knowledge generation* within your project?

- How important are each of these in contributing to project delivery?

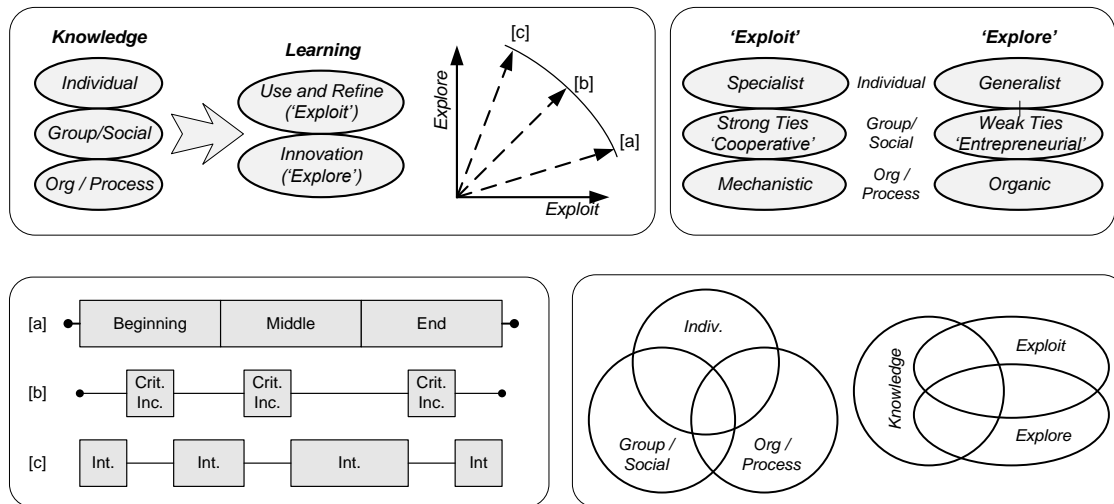
## **OUTCOME**

How does your organisation assess the progress or outcome of the project?

Can you assess firstly how well your project is going (in terms of being on plan, budget, deliveries, customer satisfaction)?

## Appendix C – Phase 2 Interview Protocol

Diagrams to explain the research:



## Questions

- 1) Tell me about the project – walk me through it, emphasise your role, behaviours and actions.
  - a. Look for IC elements – Indiv, Social, Process
  - b. Interactions – evident? What does respondent think about the interactions?
- 2) Critical incidents – can you think of any specific times of change or challenge?
  - a. Describe in detail – what happened, what did you do?
- 3) Intervening periods – how was 'business as usual?' Any different?
  - a. Describe in detail – what happened, what did you do?
- 4) Straightforward aspects vs. innovative challenges – how to manage each, and how to manage both?
- 5) Other interactions / issues / thoughts on the discussion?
- 6) Interaction effects with the other managers?

## Appendix D – Phase 2 Case Study and Coding Data

This Appendix gives some financial overviews of the cases, details of the interviews (including ‘face-to-face’ – FF, or ‘phone’ – P), and the coding of each individual.

As described in Chapter 5, the responses of the individuals were coded in terms of HC, SC, PC, Exploitation (X1) and Exploration (X2), Critical Incidents (CI), Outcome (O), Complexity (C) and Capacity and Constraints (CC). If, for example, the paragraph was coded with two elements from HC then this is referred to as ‘HC(2)’, and so forth. The results for each respondent are shown here.

The coding data is presented in terms of the number of different nodes coded and the total number of instances. Note that the latter is generally a higher number than the subsequent breakdown of codes, since details of less important codes (such as ‘role’ and ‘project history’) are not given.

### Case 1 – Banking IT

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R1	Applications Delivery Manager	Nov. 2010	F/F	48m
R2	Service Delivery Manager / Technical Lead	Nov. 2010	P	55m
R3	Delivery Assurance Manager	Nov. 2010	P	30m

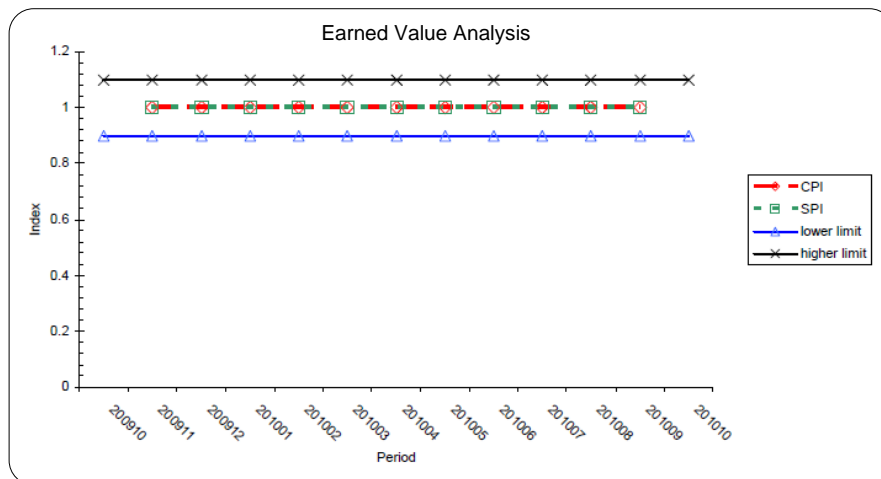


Figure D1: Earned Value Data for Case 1

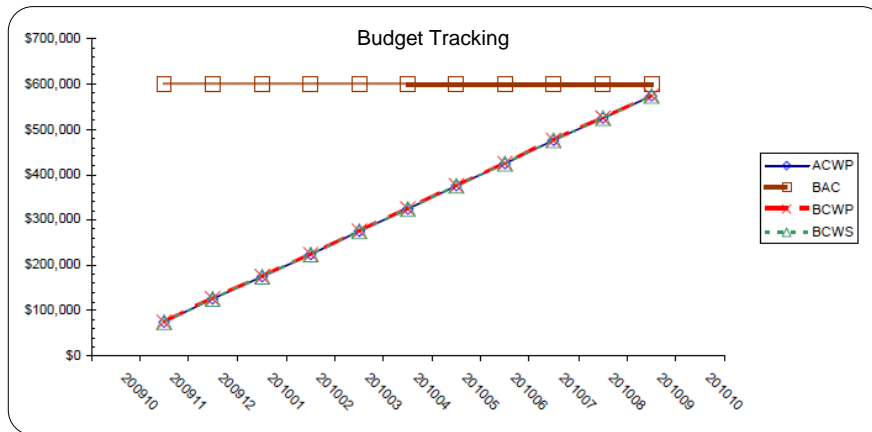


Figure D2: Budget Data for Case 1

**Applications Delivery Manager (R1)**

Coding results for R1: 40 Nodes, 117 References.

Complexities	12	Exploit	19	HC	8
Critical Incident	5	Explore	4	SC	32
Outcome	3	Meta-Theme	9	PC	13

Distributed Ambidexterity	2	PC; SC; X1(2) SC; X2
Integration	1	SC; X1(2); X2
Role Expansion	3	C; CI; PC; SC(2); X1 C; PC; X1 CI; O; PC(2); SC; X1(4)
Set the Tone	1	HC(2); PC; X1
Integration Role Expansion	1	CI; HC; SC; X1; X2(2)

**Service Delivery Manager (R2)**

Coding results for R2: 47 Nodes, 121 References.

Complexities	7	Exploit	30	HC	13
Critical Incident	3	Explore	17	SC	18
Outcome	0	Meta-Theme	9	PC	8

Distributed Ambidexterity	1	HC
Point Ambidexterity	1	HC(3); X1(2); X2(2)
Set the Tone	2	C; HC; PC; X2 C; SC
Buffer Point Ambidexterity	1	C; PC; X1
Integration Role Expansion Point Ambidexterity	1	CI; SC; X1

### Delivery Assurance Manager (R3)

Coding results for R3: 23 Nodes, 39 References.

Complexities	5	Exploit	7	HC	2
Critical Incident	2	Explore	5	SC	2
Outcome	0	Meta-Theme	2	PC	7

Distributed Ambidexterity	1	HC
Integration	1	PC

### Case 2 – Healthcare IT

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R4	Project Manager	Jan. 2011	F/F	76m
R5	Support Mgr	Jan. 2011	F/F	39m
R6	Project Analyst / Tech Mgr	Jan. 2011	F/F	42m

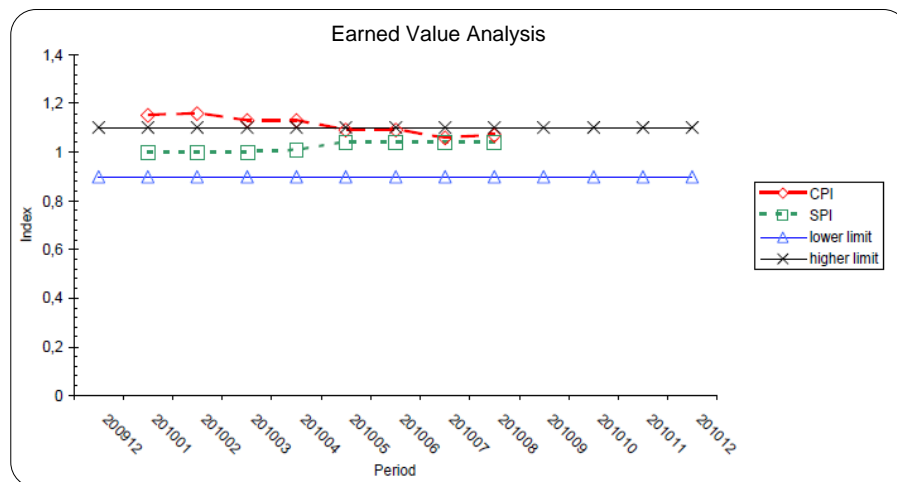


Figure D3: Earned Value Data for Case 2

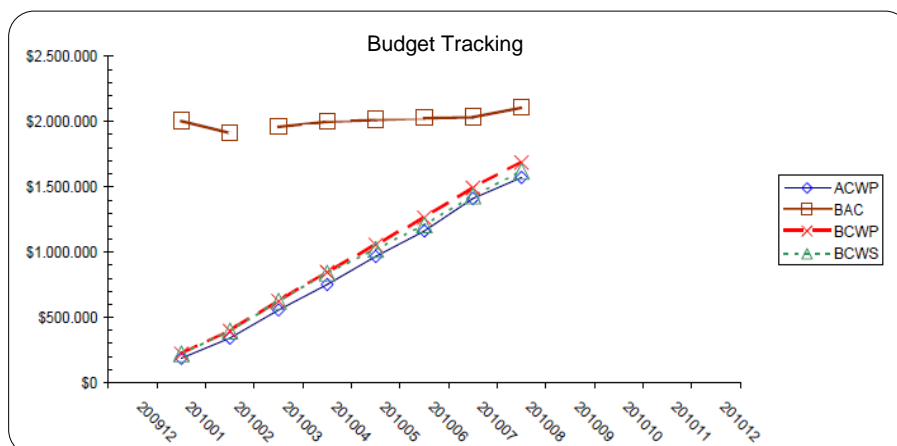


Figure D4: Budget Data for Case 2

### **Delivery Manager (R4)**

Coding results for R4: 46 Nodes, 110 References.

Complexities	9	Exploit	21	HC	5
Critical Incident	1	Explore	21	SC	11
Outcome	3	Meta-Theme	17	PC	12

Distributed Ambidexterity	2	SC SC; X1
Integration	1	PC; X2
Set the Tone	1	X2
Buffer Point Ambidexterity Set the Tone	1	CC; SC; X2;
Integration Gap-Filling Set the Tone	1	PC(2); X1(3)
Integration Set the Tone	1	PC; SC; X2(2)

### **Support Manager (R5)**

Coding results for R5: 37 Nodes, 62 References.

Complexities	5	Exploit	10	HC	6
Critical Incident	4	Explore	3	SC	6
Outcome	1	Meta-Theme	14	PC	6

Distributed Ambidexterity	1	SC; X2; X1
Integration	1	X2
Set the Tone	1	CC; HC; PC; X1
Buffer Gap-Filling Integrator Role Expansion Point Ambidexterity Set the Tone	1	CI; HC; PC; X2
Distributed Ambidexterity Self-Adjustment	1	PC; SC

### **Project Analyst (Manager) (R6)**

Coding results for R6: 31 Nodes, 58 References.

Complexities	5	Exploit	18	HC	2
Critical Incident	0	Explore	9	SC	4
Outcome	3	Meta-Theme	5	PC	6

Distributed Ambidexterity	1	CC; HC; SC
Distributed Ambidexterity Self-Adjustment	1	HC; PC; SC; X1; X2

### Case 3 – Telecoms IT

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R7	Project Manager	Jan. 2011	F/F	58m
R8	Project Support Lead	Jan. 2011	F/F	25m
R9	Programme Manager	Feb. 2011	F/F	37m

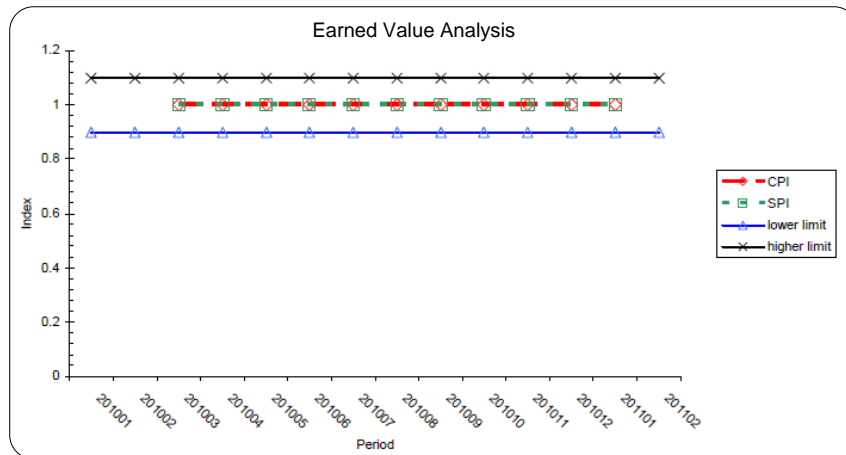


Figure D5: Earned Value Data for Case 3

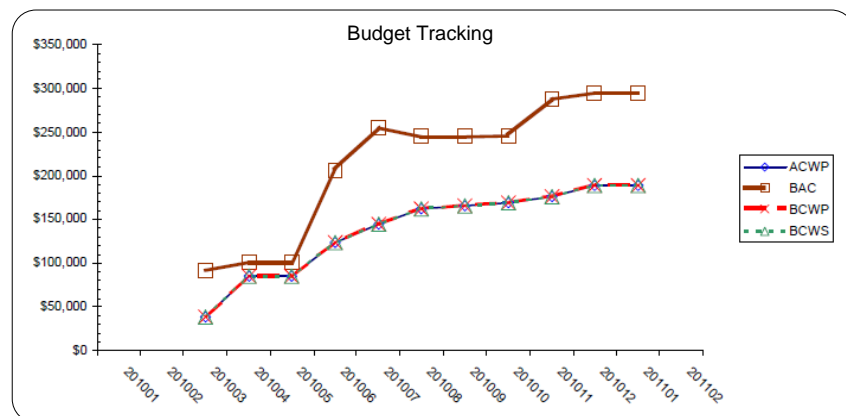


Figure D6: Budget Data for Case 3

### Project Manager (R7)

Coding results for R7: 40 Nodes, 89 References.

Complexities	7	Exploit	12	HC	5
Critical Incident	0	Explore	10	SC	10
Outcome	2	Meta-Theme	13	PC	22



Integration	1	SC; X2
Point Ambidexterity	1	HC; PC
Set the Tone	1	PC; X2
Gap-Filling Integration	1	HC; PC; X1
Integration Point Ambidexterity	3	C; PC; SC PC; X1 X1(2); X2
Self-Adjustment Set the Tone	1	PC(2); X1(3); X2(2)

**Lead Analyst (R8)**

Coding results for R8: 13 Nodes, 21 References.

Complexities	1	Exploit	6	HC	1
Critical Incident	0	Explore	1	SC	1
Outcome	1	Meta-Theme	1	PC	6

Distributed Ambidexterity	1	SC
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**Programme Manager (R9)**

Coding results for R9: 31 Nodes, 66 References.

Complexities	6	Exploit	14	HC	3
Critical Incident	1	Explore	11	SC	7
Outcome	1	Meta-Theme	7	PC	9

Set the Tone	2	CI; PC; SC; X1; X2 SC(2)
Integration Role Expansion	1	CC; HC; PC(2);X1; X2(2)
Integration Set the Tone	1	C(2); X1; X2(4)

**Case 4 – Banking IT**

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R10	Project Manager	Jan. 2011	F/F	47m
R11	Project Manager	Jan. 2011	F/F	58m
R12	Application Support Lead	Jan. 2011	P	37m

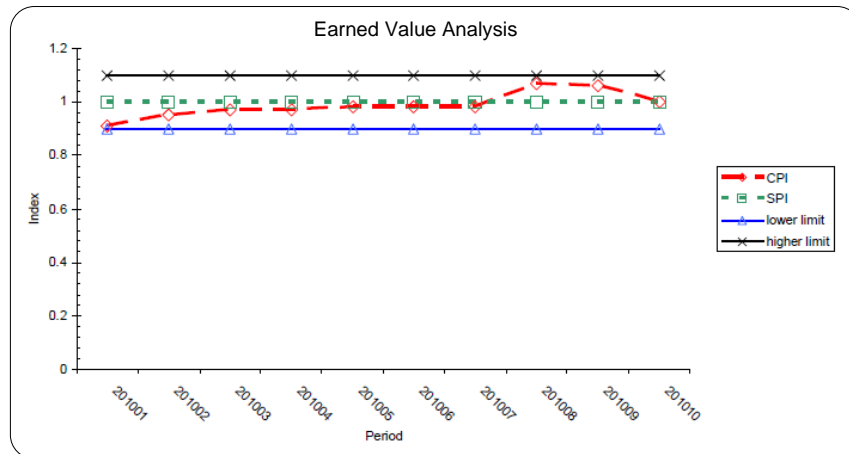


Figure D7: Earned Value Data for Case 4

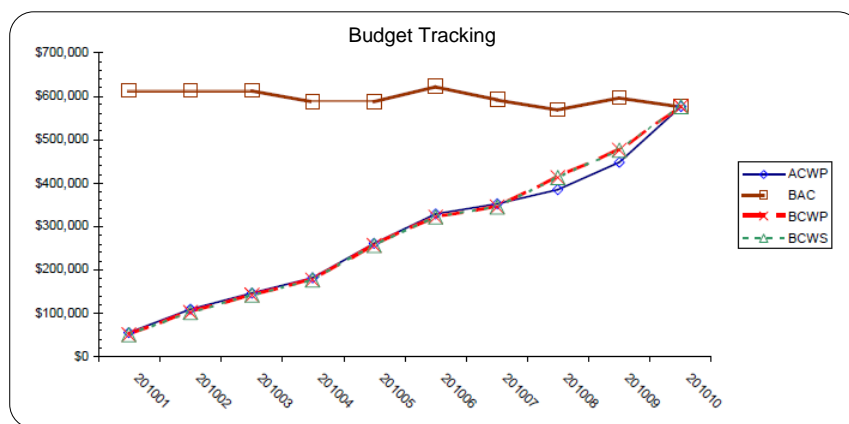


Figure D8: Budget Data for Case 4

### Project Manager (R10)

Coding results for R11: 32 Nodes, 73 References.

Complexities	7	Exploit	11	HC	4
Critical Incident	1	Explore	12	SC	15
Outcome	1	Meta-Theme	6	PC	10

Buffer	1	SC(2)
Point Ambidexterity	1	SC
Integration Role Expansion	1	CI; X1

### Project Manager (R11) – Change Requests

Coding results for R11: 32 Nodes, 62 References.

Complexities	13	Exploit	6	HC	7
Critical Incident	3	Explore	9	SC	4
Outcome	2	Meta-Theme	4	PC	7

Buffer	1	SC
Integration	1	HC(2); X2
Integration Role Expansion	1	HC; SC

### **Application Support Team Leader (R12)**

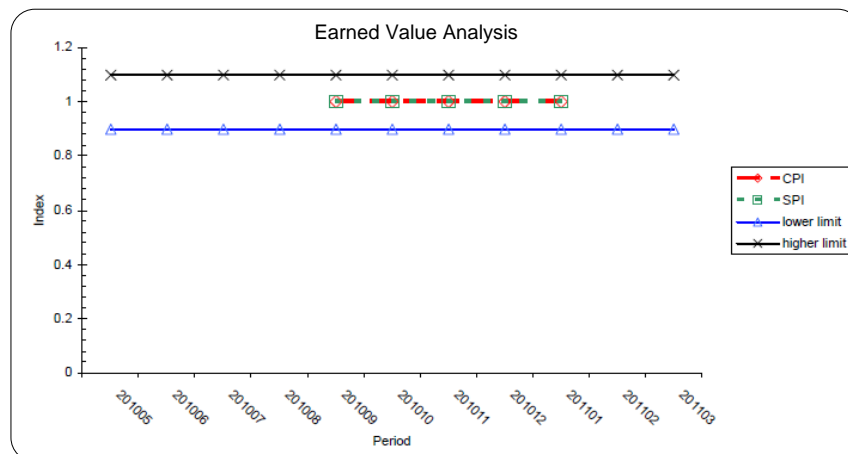
Coding results for R12: 30 Nodes, 56 References.

Complexities	5	Exploit	4	HC	8
Critical Incident	0	Explore	3	SC	14
Outcome	0	Meta-Theme	4	PC	11

Buffer	1	C; HC; X1
Distributed Ambidexterity	1	HC; PC
Integration	1	PC; X2
Self-Adjustment	1	SC(2)

### **Case 5 – Telecoms IT**

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R13	Project Manager	Feb. 2011	FF	58m
R14	Team Leader	Feb. 2011	FF	71m
[ DG ]	[ Programme Mgr ]	[Feb. 2011]	[ FF ]	[ 37m ]



**Figure D9: Earned Value Data for Case 5**

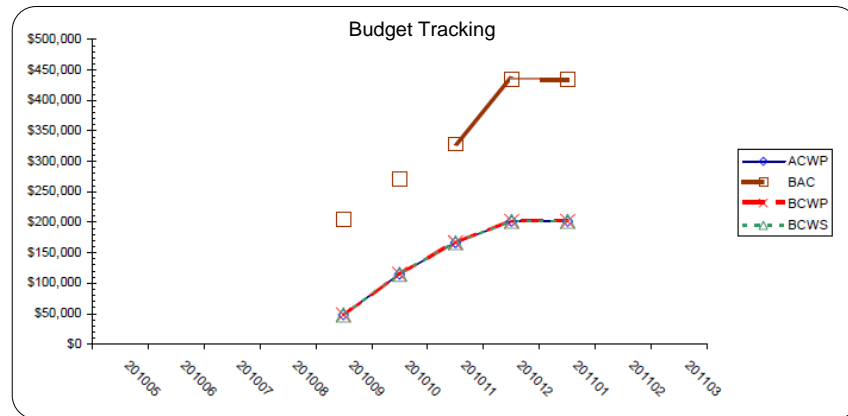


Figure D10: Budget Data for Case 5

**Project Manager (R13)**

Coding results for R14: 35 Nodes, 79 References.

Complexities	11	Exploit	12	HC	8
Critical Incident	2	Explore	17	SC	3
Outcome	1	Meta-Theme	11	PC	4

Integration	4	C(2); CC; PC; X1; X2 HC SC; X1(2) X2(3)
Role Expansion	1	HC; PC; SC
Gap-Filling Integration	2	CI; HC HC

**Team Leader (R14)**

Coding results for R14: 41 Nodes, 112 References.

Complexities	9	Exploit	16	HC	7
Critical Incident	2	Explore	14	SC	18
Outcome	2	Meta-Theme	10	PC	22

Gap-Filling	1	HC; PC; X1
Integration	1	C; PC; SC(2)
Set the Tone	1	PC(2); X1
Distributed Ambidexterity Point Ambidexterity	1	HC(2); PC(2);
Integration Point Ambidexterity	1	HC; PC;
Gap-Filling Integration Role Expansion	1	CI; HC; PC

**Programme Manager (R9)**

As Case 3.

## Case 6 – Government Services

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R15	Project Manager	Feb. 2011	FF	76m
R16	Technical Lead	Feb. 2011	F/F	49m
R17	Programme Office Manager	Feb. 2011	P	37m

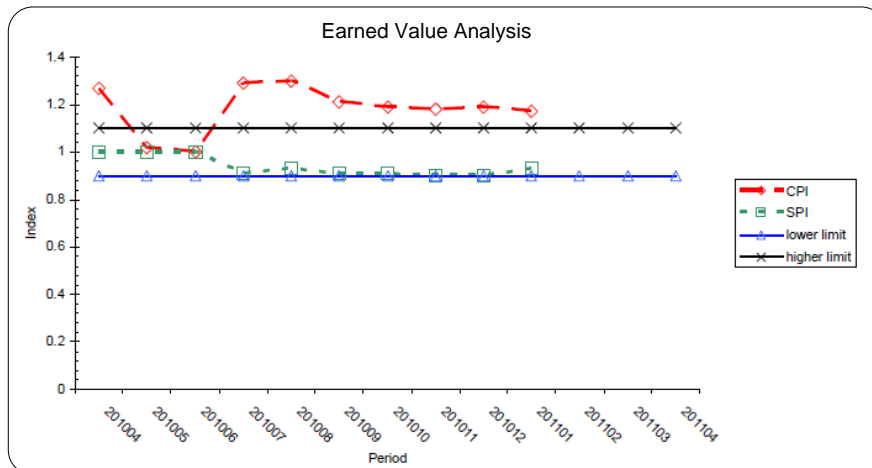


Figure D11: Earned Value Data for Case 6

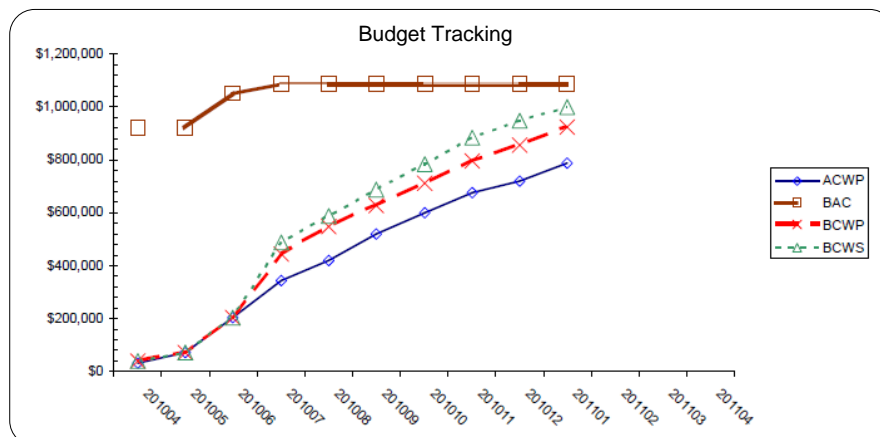


Figure D12: Budget Data for Case 6

### Project Manager (R15)

Coding results for R15: 42 Nodes, 121 References.

Complexities	20	Exploit	18	HC	9
Critical Incident	3	Explore	18	SC	11
Outcome	1	Meta-Theme	23	PC	8

Distributed Ambidexterity.	2	C; X1(2); X2(2) HC; X1
Integration	6	C; CC; SC(2) C; HC; PC; X1 C; PC; X1(3); X2 C; SC; X2

		C; X1(2); X2(2) PC
Set the Tone	1	SC; X2(2)
Buffer Integration	1	HC(2) HC; X2
Distributed Ambidexterity Integration	1	CC; C2; X1; X2 HC; PC; X1(2)
Gap-Filling Distributed Ambidexterity Integration	1	C; HC(2)

**Tech Lead (R16)**

Coding results for R16: 38 Nodes, 114 References.

Complexities	7	Exploit	24	HC	8
Critical Incident	4	Explore	28	SC	14
Outcome	2	Meta-Theme	8	PC	12

Buffer	1	PC
Integration	1	HC(2)
Set the Tone	1	X1(2); X2(2)
Integration Set the Tone	1	X2; X1;
Distributed Ambidexterity Gap-Filling Integration	1	SC; HC

**PMO Manager (R17)**

Coding results for R17: 25 Nodes, 53 References.

Complexities	0	Exploit	12	HC	7
Critical Incident	0	Explore	3	SC	5
Outcome	1	Meta-Theme	8	PC	4

Buffer	1	SC
Integration	2	HC; PC; X1 HC; SC; X1
Set the Tone	2	HC; PC; X1 X1; X2
Integration Set the Tone	1	HC(2); PC; X1

## Case 7 – Banking IT

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R18	Applications Services Mgr.	Feb. 2011	FF	104m
R19	Project Manager	Feb. 2011	FF	94m
R20	Technical Lead	Feb. 2011	FF	20m
R21	Team Leader	Feb. 2011	FF	24m
R22	Team Leader	Feb. 2011	FF	23m

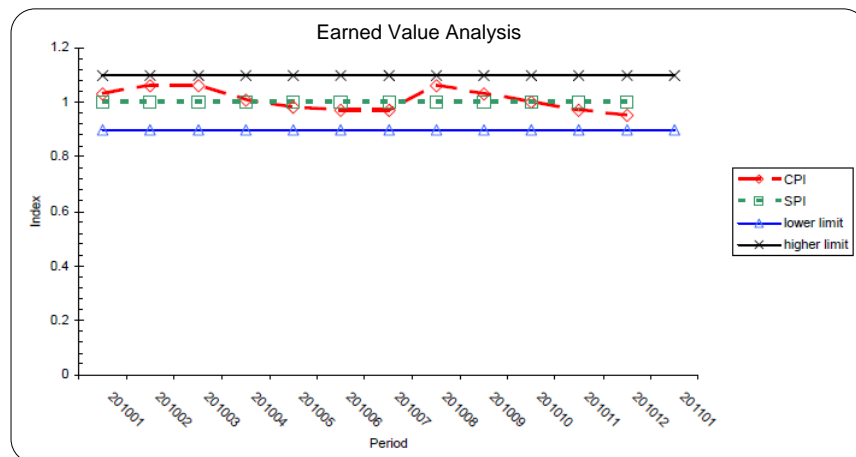


Figure D13: Earned Value Data for Case 7

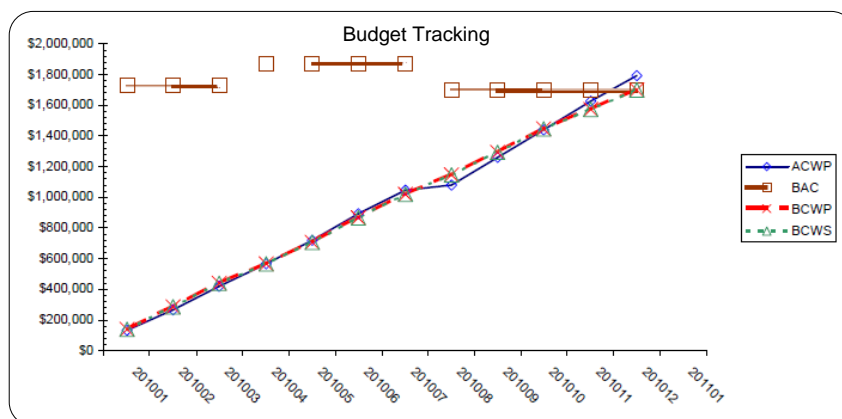


Figure D14: Budget Data for Case 7

### Applications Service Manager (R18)

Coding results for R18: 46 Nodes, 165 References.

Complexities	12	Exploit	26	HC	18
Critical Incident	13	Explore	28	SC	14
Outcome	2	Meta-Theme	20	PC	13

Buffer	1	HC
Gap-Filling	1	HC(2); SC;
Integration	3	C; CI; X1 SC; X1(2); X2;

		X1(2)
Role Expansion	1	CI; HC; SC; O; PC
Self-Adjustment	1	HC
Set the Tone	1	PC; SC
Buffer Distributed Ambidexterity Set the Tone	1	PC; X2(2)
Integration Point Ambidexterity	1	HC(2);
Integration Role Expansion Set the Tone	1	CI; X2(2); X1; C
Integration Set the Tone	1	X2(2); HC
Point Ambidexterity Role Expansion	1	CI; HC(3); PC

**Project Manager (R19)**

Coding results for R19: 34 Nodes, 92 References.

Complexities	15	Exploit	22	HC	8
Critical Incident	1	Explore	15	SC	4
Outcome	1	Meta-Theme	12	PC	4

Self-Adjustment	1	CC; CI; PC; X1
Distributed Ambidexterity Gap-Filling	1	HC
Gap-Filling Integration Point Ambidexterity	1	HC(2); PC

**Technical Lead (R20)**

Coding results for R20: 25 Nodes, 37 References.

Complexities	7	Exploit	5	HC	6
Critical Incident	1	Explore	2	SC	4
Outcome	0	Meta-Theme	2	PC	2

Buffer	2	C; HC SC; X1
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**Team Leader (R21)**

Coding results for R21: 26 Nodes, 44 References.

Complexities	9	Exploit	4	HC	3
Critical Incident	1	Explore	1	SC	6
Outcome	1	Meta-Theme	10	PC	5



Buffer	1	C; X1
Buffer Distributed Ambidexterity Integration Role Expansion Self-Adjustment	1	HC; SC(2)
Buffer Integration Self-Adjustment	1	HC; PC(2)

**Team Leader (R22)**

Coding results for R22: 26 Nodes, 36 References.

Complexities	5	Exploit	7	HC	1
Critical Incident	1	Explore	5	SC	5
Outcome	1	Meta-Theme	2	PC	6

Distributed Ambidexterity	1	PC; SC(2); X1; X2
Self-Adjustment	1	PC; X2

**Case 8 – Defence IT System**

<i>Individual</i>	<i>Role</i>	<i>Date</i>	<i>FF / P</i>	<i>Duration</i>
R23	Programme Manager	Mar. 2011	FF	93m
R24	Test Manager	Mar. 2011	FF	30m
R25	PMO Lead	Mar. 2011	FF	19m
R26	Technical Lead	Apr. 2011	P	25m

Note: For Case 8, performance data was not available from the same source. Alternative gate-review data was reviewed.

**Programme Manager (R23)**

Coding results for R23: 30 Nodes, 73 References.

Complexities	10	Exploit	12	HC	7
Critical Incident	6	Explore	14	SC	9
Outcome	0	Meta-Theme	8	PC	5

Integrator	2	CI; HC; X1; X2 CI; X2
Role Expansion	1	CI; SC(2)
Set the Tone	1	C; CI; X2
Distributed Ambidexterity Integrator Point Ambidexterity	1	HC; SC(2)

**Test Manager (R24)**

Coding results for R24: 24 Nodes, 42 References.

Complexities	3	Exploit	9	HC	4
Critical Incident	0	Explore	6	SC	2
Outcome	1	Meta-Theme	5	PC	9

Buffer	2	C; CC; HC; PC PC			
Point Ambidexterity	1	HC; PC(2)			

**PMO Leader (R25)**

Coding results for R25: 27 Nodes, 39 References.

Complexities	4	Exploit	2	HC	5
Critical Incident	0	Explore	7	SC	5
Outcome	1	Meta-Theme	2	PC	9

Distributed Ambidexterity Integrator	1	C; HC; PC			
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**Technical Lead (R26)**

Coding results for R26: 22 Nodes, 53 References.

Complexities	11	Exploit	5	HC	11
Critical Incident	6	Explore	2	SC	6
Outcome	0	Meta-Theme	6	PC	5

Integration	3	C(2); CI; PC; SC; X1 C(2); CI; SC; X1 CI; HC; X1			
Buffer Integration	1	CI; SC			

**Appendix E - Examples of Case Study Second-Cycle Coding (Single-Element)****1. Buffering**

<b>Coding and Source</b>	<b>Quote</b>
SC(2) Case 4 I/V 1 (R10)	<i>"I think they also felt that they needed someone to look after them from the point of view of shielding them a little bit, they felt that they were getting perhaps requests going direct to them that were sort of conflicting in their time and they saw I think very quickly that I would add value by actually shielding them sometimes from some of those requests, not by trying to manage what they do or how they manage their time or anything like that but sort of a bit of a voice of reason to say 'you can't ask him to do that, he's too busy' or 'don't ask for favours when you should be paying for them.'"</i>
SC Case 4 I/V 2 (R11)	<i>"I would say there's moments where it's quite stressful, I think they are probably under quite a lot of pressure themselves with everything but I would say yes it's fairly good-natured, there are occasions when it can get heated, I think [R10] probably sees that more than I do, the level I'm at."</i>
C; HC; X1 Case 4 I/V 3 (R12)	<i>"I tend not to get involved face to face with the client on a call-to-call basis because the project managers tend to handle that interface and now and again they'll drag in one of our subject matter experts to explain something so I tend not to have a lot of eye contact as far as this project is concerned."</i>
SC Case 6 I/V 3 (R17)	<i>"I must admit we don't lay down to them, we have a program manager who I work directly to who is very, very good at managing the client, pushing back on them."</i>
HC Case 7 I/V 1 (R18)	<i>"I get all the corporate nonsense that you have to look at and my manager before, a chap called [name], he used to spend all his time doing the management stuff, you know, constantly in teleconferences and we'd go and talk to him and he'd talk to us. He was still in the teleconference, but, you know, so it obviously wasn't important."</i>
C; CC; HC; PC Case 8 I/V 2 (R24)	<i>"I think [R23] buffered us a lot, there was a lot of politics involved I believe, because it's not just – [R23] sits on the second floor, all his section are project managers – and I would say pretty much independent from each other, so they will focus on their own project and they'll be fighting for the same resource."</i>

**2. Gap-Filling**

<b>Coding and Source</b>	<b>Quote</b>
HC; PC; X1 Case 5 I/V 2 (R14)	<i>"... we do have the strict process to follow, reviews, all that type of thing. The hardest thing is getting the Egyptians to follow that process. Often I end up just putting all the comments. They do proper peer reviews, all that type of thing, they just don't put it into the log files, which is annoying. So you can track it by email but you haven't got it in the spreadsheet, which is fine as far as I'm concerned, I don't care where it's tracked but [Company] like it tracked in the spreadsheet so I have to do that."</i>

HC(2); SC Case 7 I/V 1 (R18)	<i>"And you do need process, you know, I think, you know, if you talk to [name], who is anti-any sort of process at all. If you say to him, 'I think you need to get this 42-page document that you produced reviewed.' 'Why? Why should I?' 'Okay, but we now also need to fill in WPR form because otherwise we'll have an NC [non-compliance].' 'I'm not filling in no WPR form.' So you have to, you know, so you've got people like that who will say, 'Look, I'm not touching this at all, ever.' And you just let him get on the work then and you do the processes around... Yeah, let's hold the review, I'll document it and I'll put it in the WPR form and then put a tick in the box."</i>
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### 3. Integration

<b>Coding and Source</b>	<b>Quote</b>
SC; X1(2); X2 Case 1 I/V 1 (R1)	<i>"[M]ost of my role was nursing that, really and trying to get things problem-sorted and the two sides kind of undertaking the actions they kind of owned. Very young, set of people up in [location] at [bank] really didn't have any discernable methodologies, things were kind of fixed ad hoc and things were responded to ad hoc."</i>
SC; X2 Case 3 I/V 1 (R7)	<i>"For this project it was primarily PM to PM but also there was a certain amount of techy to techy or PM to techy, certainly in terms of defining that scope and solution early on, a lot of conversation between [customer] architecture people and the tech lead on our side and a certain amount of clarification perhaps went through me and vice versa but the majority I would say would have been PM to PM."</i>
HC(2); X2 Case 4 I/V 2 (R11)	<i>"And that was part of the reason why I ended up taking on the innovation stuff as well, I'm quite good at being able to build organisation around stuff and with regards to the innovation, when it was effectively pushed onto the account to say 'start doing some more round innovation', as such, we had no model at all and so it was really building a structure around that, I quite enjoyed doing that."</i>
X2(3) Case 5 I/V 1 (R13)	<i>"...so now I am the only [customer] project manager. A kind of everything role."</i>
HC Case 5 I/V 1 (R13)	<i>"Kind of the old things that you know but don't always find time to do. A lot of stuff you kind of think, I wish I'd looked at this last week but of course it's not quite on the critical things to do today. So all this stuff around, just that [equipment] for example. I think I should have been pushing [customer] 3 weeks earlier to actually have it rather than just relying on them saying so, stuff like that. There's an extent to which you understand someone has an action and you perhaps follow up on it. You kind of rely on it being done So I think it's a bit of a balance between micro-managing and making sure that stuff absolutely critically has to be done, actually does get done."</i>
C(2); CI; SC; X1 Case 8 I/V 4 (R26)	<i>"In the early days after the go-live date we found that people couldn't in actual fact make a successful connection to the [application]. So after the go-live date for [name] upgrade, we spent a lot of time fire-fighting in a totally disorganised fashion,</i>

	<i>to be honest. We then stopped what we were doing, had a long talk, think about how we can better control what was happening because we were finding that as a project team from [R23]'s perspective, he didn't just have issues with [application], he had significant performance issues on the live system."</i>
CI; HC; X1 Case 8 I/V 4 (R26)	<i>"So [R23] had a team of specialists brought in from [supplier] to assist us after we collected our thoughts and decided on the resources we needed and priorities of the different problems that we had and we started to collate all the problems and prioritise them and begin to address them one by one over the course of about 2 months in elapsed time. I guess we finally got to the point where 99.9% of the issues that had got through the testing phase were pretty much addressed."</i>

#### 4. Role Expansion

Coding and Source	Quote
C; PC; X1 Case 1 I/V 1 (R1)	<i>"I escalated some concerns about the responsiveness of [supplier] and how they were working to the SLA [service-level agreement] because there was an SLA about response times and different categories of call, it wasn't being met. It was supposed to be responded to in 4 hours and fixed in 24 and it was taking more like a week. So things like that. So I raised a relatively high level of escalation about a year ago and I spoke to somebody relatively senior, the UK Ops manager, and we agreed some things to try and improve that in terms of we would monitor the responsiveness, that they would attend regular meetings, and that improved the situation for a while then they started to fall apart again. I had to renew the escalation, arse-kicking and pushing on a relatively regular basis. Because even at a relatively senior level, there didn't seem to be a lot of manager support."</i>
C; CI; PC; SC(2); X1 Case 1 I/V 1 (R1)	<i>"A week after that I phone [bank] commercial guy that I faced off to and I eventually phoned him on my land line rather than my mobile and he picked up the phone and was very embarrassed and said 'we are not renewing, we are going to contract through with [supplier]' and that was literally 2 weeks before the renew. I escalated, I discovered at that point we had a wider commercial relationship with [supplier] and escalated that up to [Company] global. We had a meeting with some senior people in [supplier] and they had a look at it and said they were very sorry, and didn't know it was happening and so on, so in terms of that couple of months when I was concerned that nothing was happening I was making a approaches to a number of people in [bank] trying to get things moving."</i>
HC; PC; SC Case 5 I/V 1 (R13)	<i>"It's trying to get hold of the right people and persuade them that they want to assist this weekend when, clearly, what they want to do is NOT!"</i>

## 5. Setting the Tone

Coding and Source	Quote
HC(2); PC; X1 Case 1 I/V 1 (R1)	<i>"It was pretty well-established when I took over from previous [Company] PM who was simply moving on to something else. It was already pretty well defined, which may have been part of the issue because he wasn't particularly process focused himself so I think at that point the three parts had a pretty slap-dash approach to managing the project. I found some resistance when I came in and naturally thought that we would bring a more disciplined approach to the way the project was managed. Because of the lack of ability to do fairly simple things, like have regular meetings and track issues, then broadly speaking we troubleshoot. Troubleshooting could have occurred on many occasions a lot quicker than it did simply because the comms back from [supplier] and issues they were resolving and stuff they needed from [their supplier] wasn't coming quickly enough."</i>
X2 Case 2 I/V 1 (R4)	<i>"There's a bit of a culture change. Culturally, they are dinosaurs. But it's a legacy they've had and it has to change. The management within the team has to change. I'm just a newcomer with a completely different background and I've experienced it before."</i>
PC; X2 Case 3 I/V 1 (R7)	<i>"I think we've shared a lot of flexibility in how we've worked with them which has been very good in terms of customer relationships but obviously hasn't necessarily meant – I think they've probably spent twice as much money as they needed to, to get what they want delivered."</i>
CI; PC; SC; X1; X2 Case 3 I/V 3 (R9)	<i>"I maintain a very close relationship with the stakeholders, so before anything gets escalated from product and project manager to the account manager we have already discussed that... That is working well and also like we are working with the same team for four years and when things were not great four years back, but we have established some processes, it has become like a factory type of thing with really fine processes."</i>
PC(2); X1 Case 5 I/V 2 (R14)	<i>"What we learned from that is the importance again of making sure that projects are properly tracked and knowing where something is, having strict timetable for the more complex projects, that type of thing. And also for less complex projects, knowing when stuff needs to be delivered, if stuff is going to be late, people being able to help, that type of thing... That's what we've learnt. Just to plan and plan again."</i>
SC; X2(2) Case 6 I/V 1 (R15)	<i>"The main change was the ideology of how the project should be run. Basically, do the design, we go away, develop it and then we come back with 'ta-da, there it is!' Whatever reason, they decided they wanted a more integrated approach so they request, we then re-scope the project, tell them how we think it's going to work, a bit of negotiation, settle on a result, kept the same timeline so everybody was happy on that so that worked OK."</i>
PC; SC Case 7 I/V 1 (R18)	<i>"If you're given a target you have to hit the target somehow. And if you're not going to hit it, you have to give us plenty of warning to say you're not going to hit it. And I think it's just the</i>

	<i>nature of the way the team is built."</i>
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## 6. Distributed Ambidexterity

Coding and Source	Quote
HC Case 1 I/V 2 (R2)	<i>"I was doing service delivery management, managing the support service whereas the PM was exactly that, managing the project. And even after that, [R1], they did more on the relationship in terms of financials and legals and terms and conditions whereas I was focusing more on the technical issues that were being reported and putting action plans in place to keep the system up and running."</i>
X1; SC Case 2 I/V 1 (R4)	<i>"The team are good, they do take that root cause approach of – 'let's fix the incident', and leave that off until we can determine if we can do this differently... That is embedded in them. One of the good sides of the culture. They will naturally do it... For the most part they get on with it. I will raise questions but there's nothing been disastrous. We have a daily monitoring report that comes out and it's got one day to breach and I'll be talking to them saying, 'OK, tell me about it', and they say, 'don't worry about it, it's all signed off'. It's generally very calm and well managed... I trust them, I let them do it.... They can fix things much better than me, I'd be there to get in the way and ask question they probably won't answer."</i>
C; X1(2); X2(2) Case 6 I/V 1 (R15)	<i>"So having gone through the prototype and got that signed off, we then did our own internal testing, that worked OK, that involved getting resources in from a leveraged group inside the organisation. We didn't have dedicated on-site guys for that. We had a point man who was our contact for that group who had the infrastructure, had the test rig, but the staff seemed to be bought in for 2 or 4 weeks at a time, then flit off and do testing on another account. Very sort of, see them all off, wave them goodbye at the end of it. Different way of working. So core project team, you've got them all the time."</i>

## 7. Point Ambidexterity

Coding and Source	Quote
HC; PC Case 3 I/V 1 (R7)	<i>"[T]here's nothing else immediately on the horizon and there wasn't for probably the preceding two months before Christmas, so I was in the process of starting the close down activities but new there maybe more work coming which then subsequently came, so you know come next week I'll probably start on beginning to close this down again but whether that actually happens remains to be seen."</i>
HC; PC(2) Case 8 I/V 2 (R24)	<i>"I think it was flexible. I could do what I wanted as long as I could justify it, because [R23] was quite hands-off in that sense, and said 'You are test managing it, what's your opinion? You're the one signing off on it.' Which was fair enough, because it comes down to me to sign off that the testing was done. And I would get the blame if it wasn't done"</i>

	<i>correctly or whatever.... He was taking my judgement. He did that with quite a lot of teams and performances. He said, 'You tell me what needs performances. This is what I want tested, you tell me if there's anything missing.' So it wasn't a case of – 'This is what you've got to do.'"</i>
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### 8. Self-Adjustment

<b>Coding and Source</b>	<b>Quote</b>
SC(2) Case 4 I/V 2 (R11)	<i>"Yes certainly a lot of flexibility in terms of people leading themselves, we've got a lot of weekend work, so we've had to schedule ourselves on a rota basis and cover weekends... We've got to do stuff every weekend between now and June, what's your availability at weekends between now and June, so tend to say ok these are the weekends I can make and everyone else says the same and then we look for holes and see who can cover that, so that's kind of well covered and it worked well last year, so that was alright."</i>
HC Case 7 I/V 1 (R18)	<i>"But what we found, we had some other people who left, [name], and everybody said, 'Oh, my God, if he goes we've had it.' And he went, and nothing changed. People step up. You know, because that person isn't there anymore, they've got to find things out for themselves. Instead of going to [name] and asking him, they think, 'Oh, right, he's not there now, so I'm going to have to find out myself', and they do. You know, and sometimes it creates opportunities for people to step up and that's what I was hoping for with the test manager role that somebody would step up and say, 'Yeah, I really want to do this.'"</i>
PC; X2 Case 7 I/V 5 (R22)	<i>"Yeah so a lot of our problems do arise overnight and sometimes we have to fix things on the fly when we haven't got the other support of the other teams around. So it's just a case of solving the problem quickly and then going through the processes the next day to put everything else in place."</i>



## **Appendix F - Examples of Case Study Second-Cycle Coding (Multiple-Element)**

### **1. Buffering; Gap-Filling; Point Ambidexterity; Role Expansion; Set Tone**

<b>Coding and Source</b>	<b>Quote</b>
CI; HC;PC; X2 Case 2 I/V 2 (R5)	<i>“Business as usual, things tick over, I don’t have to do anything, people just take the calls they are supposed to be taking, work on the calls they have already got. On a day when something goes wrong it’s a question of making sure we’ve got enough people allocated to deal with the problem and that we’re managing the communication with the customer by single point... Just make sure we are doing what we need to do, we know that we sought advice from the experts in the team, got them involved as necessary, just continually review twice a day. I’ll just keep talking to everybody in the team who is working and just make sure things are going as expected and that we are dealing with the problem.... and identify what needs to happen quickly, make sure that’s gone, do a longer term mop-up, which is going on at the moment.”</i>

### **2. Buffering; Integration**

<b>Coding and Source</b>	<b>Quote</b>
HC Case 6 I/V 1 (R15)	<i>“My background is databases, a bit of comms years ago, but not document and image scanning systems. I can understand the technical element down to a certain level. If I can make them speak slowly enough! They’re grown-ups, they’re not kids doing this stuff so they can be trusted. My job is to act as an intermediary and facilitate to make sure they had what the needed to get to the answer, whereas more time, more resources, external help, whatever. And as an information broker to make sure the clients and our own management were kept apprised of any technical issues and if there really was an issue, to give our guys enough breathing space to get on with it, rather than management descend and tap on their shoulders every five minutes. My job is to do the ‘Have you done it?’”</i>
CI; SC Case 8 I/V 4 (R26)	<i>“Initially you get the customer trying to get involved with certain people at different levels within the customer hierarchy, trying to approach members of the team, guys who are doing the fire fighting. There’s a lot of attempt to make direct contact to try and find out more accurately what is going on. At the time, to be honest, we didn’t really know what was going on. It was counterproductive for us to communicate directly what we needed to do was to have a focal point within the [Company] side of the business to talk to the customer side of the business so that we were only feeding them one set of information.”</i>

**3. Buffering; Integration; Self-Adjustment**

<b>Coding and Source</b>	<b>Quote</b>
HC; PC(2) Case 7 I/V 4 (R21)	<i>"Coordinate it, feed into the project management and sometimes their coordination is left to the project management, but it just depends how much technical stuff there is happening and who grabs hold of it, I guess."</i>

**4. Buffering; Point Ambidexterity**

<b>Coding and Source</b>	<b>Quote</b>
X1; C; PC Case 1 I/V 2 (R2)	<i>"It was solvable but it took a lot of effort. The [Company] project manager towards the end would know which vice president to call to get a decent enough response out of that company... the contract says this, 'thou shalt deliver'. And he'd be speaking to the UK manager and UK manager would promise something and that wouldn't happen, so he'd just go one level up in the organisation and beat them with a stick until they delivered."</i>

**5. Buffering; Point Ambidexterity; Set Tone**

<b>Coding and Source</b>	<b>Quote</b>
CC; SC; X2 Case 2 I/V 1 (R4)	<i>"I've got the day-to-day management of the team, dealing with issues all the time, providing guidance to the team leaders. Unfortunately, it's a team that's been together forever, so they've kind of got used to doing their job and what I've tried to do is pull out members of the team to take more of a leader role... there's a bit of reluctance to do it, or has been, but the culture within the team is always to kind of keep them down? So any kind of issue to them was always kind of frowned upon, you do your job and that's what it is, you stay where you are. I'm trying to change that, I want everybody to take the initiative and see what we can improve here"</i>

**6. Distributed Ambidexterity; Point Ambidexterity**

<b>Coding and Source</b>	<b>Quote</b>
HC(2); PC(2) Case 5 I/V 2 (R14)	<i>"I own the overall thing and I take the estimates that people produce, then I take [customer's] decisions on when they want work doing and slot all that in, so assign people to the different projects, then those individual projects have a technical lead on those projects. I'll also decide normally, who the technical lead is for each one. Then when they are leading a project it's up to them to actually plan out the individual bits."</i>

**7. Distributed Ambidexterity; Gap-Filling**

<b>Coding and Source</b>	<b>Quote</b>
HC Case 7 I/V 2 (R19)	<i>"I think one of our failings is that we haven't got a single point of contact on the technical side, sort of a technical lead and architect type person. And in effect, what tends to happen then is that sometimes I get involved in trying to manage technical issues which really I'm not best placed to do because I haven't got the background in the system... I've come in from the outside, effectively, I've never been involved in any of the system development or the testing, whatever, where you would get that type of knowledge, which would be useful. And that's different to projects where I've worked in the past where although I might be there as a project manager, I would have some sort of technical background in what was being delivered as well."</i>

**8. Distributed Ambidexterity; Self-Adjustment**

<b>Coding and Source</b>	<b>Quote</b>
PC; SC Case 2 I/V 2 (R5)	<i>"We manage the work, my colleague and myself. We split the incidents, the calls, into what we call front line and back line. So front line is things that come in and get resolved fairly quickly, quick data fixes or requests to do something and you get your longer term, there's a serious problem, we need to write a patch so incidents and problems are split along those lines. But we also work as a pair, really, both keep an eye on everything. We manage the work, but in terms of actual staff [R4] is at the moment the Project Manager. This new model is to be rolled out where we are going to HR management as a completely separate function but at the moment [R4] is the PM, he is also the HR manager. He has devolved some of that work so that... my colleague and myself, we've taken responsibility for doing that, performance reviews are ongoing, sort of half a dozen people each."</i>

**9. Gap-Filling; Integration**

<b>Coding and Source</b>	<b>Quote</b>
HC; PC; X1 Case 3 I/V 1 (R7)	<i>"[R]ecently there was one specific issue, requirement traceability and that's incredibly difficult because actually we don't have a [document] for any of this work so we never really started from the position of saying these are the defined requirements and therefore creating some sort of traceability matrix and so trying to get through an audit where they say 'where's your traceability of requirements?' requires a certain amount of imaginative thinking and I'm not sure really rigorously if you looked at that whether you'd actually say you'd pass that audit criteria and for me it was saying we've got these test reports which basically detail what's been tested, that's our tracking of requirements, but really that doesn't touch on what you've done at design level or anything"</i>

	<i>like that so I think if you looked at it more rigorously perhaps it wouldn't actually pass where it has."</i>
C; HC Case 5 I/V 1 (R13)	<i>"...on the Monday leading up to Christmas, that was all in hand and then the day before Christmas Eve, we got a phone call from him saying, they still hadn't provided him with [equipment] and there was still no parking space. So you are in a situation where on Christmas Eve you are trying to find someone else that can cover for him. It's just a shambles."</i>
C; HC Case 5 I/V 1 (R13)	<i>"I am a massive single point of failure, to be honest."</i>

#### 10. Gap-Filling; Integration; Point Ambidexterity

Coding and Source	Quote
HC(2); PC Case 7 I/V 2 (R19)	<i>"So even down to getting purchase orders raised, and making sure that the suppliers get paid through our SAP system as well, so their invoices would come in and we would see their invoices. If there are problems with the invoices I tend to get involved in that as well. So yes, I tend to get involved in more or less everything on the management of the third party suppliers, which is different to other projects where I've been. I suppose the difference here is because it's a relatively small team, we haven't got a PMO or any sort of admin type organisation that sometimes does that type of thing. When I've worked on other larger military projects you tend to have a separate team that would handle those aspects. Here I have to get involved in all of it really."</i>

#### 11. Gap-Filling; Integration; Role Expansion

Coding and Source	Quote
CI; HC; PC Case 5 I/V 2 (R14)	<i>"Everything kicked off on the Friday, but the way the working week works is it's Sunday to Thursday, so all I could do was fire off an email request on Friday saying, 'Are you in?' so that if they got in on the Sunday they could contact me and say, 'Yes, we are in'. On the Monday when I got in, there was no response from them so I started phoning the numbers I had but the mobile numbers I had weren't connecting and the desk phones were just ringing. So at that point I immediately contacted all the project managers that were affected and said, 'we've got no offshore resource at the moment, I don't know when they are going to be back, but you need to tell [customer] that things are suspended until further notice.' And luckily there was nothing urgent on the roadmap. If there had been, it would have been a case of I would have had to pick it up and taken over because I generally assign half my time when they are doing work I always put in every day of duration for a project I put in half a day for me to manage that so there's leeway there for managing down time."</i>

**12. Integration; Role Expansion**

<b>Coding and Source</b>	<b>Quote</b>
CI; HC; SC; X1; X2(2) Case 1 I/V 1 (R1)	<i>"It was like a more extreme example of the day-to-day stuff, a lot of stuff like getting people on site, getting responses back from various people in the change. There was always a problem and when you get a major incident then it becomes more critical to get those responses back so I guess just more focus on my part, jumping up and down a bit more, more aggressively trying to move things along."</i>
CC;HC;PC(2);X1; X2(2) Case 3 I/V 3 (R9)	<i>"I got a call from [name] who is the project manager for [customer] that our [project] needs to deliver by the end of March, so what can I do?... So the only thing we can do either deprive a few of the projects or to run in parallel, so we give a few of the options and that night we said we provided those options, next morning at the director level it was discussed and decided, ok deprive these projects and ok these are the things we've provided, a few of the options and give back and then we started the project and that is on track to deliver by the end of March. I think that's the support that I provide to the project managers but on a day to day basis I am not that closely involved in all the projects... I have a very good review of the projects and then also whenever there is any escalation or any risk escalated from the project managers then I deal with that."</i>
CI; X1 Case 4 I/V 1 (R10)	<i>"...the jobs that go through [location] just stopped and at that stage we would have control groups forming, so we had account control groups, if it's not looking like it's going to be a quick recovery, at that stage we'll also have control groups with the customer because obviously they are expecting certain files and things coming from us to start off their batch processing which is like the debiting and crediting of customers accounts, so they at that stage also become involved in control groups. We established which bits were running, what bits weren't, whether we had to do something with the bits that were running to hold things, to stop them queuing up waiting to get to [location] and then we had a number of hours where nothing really happened and you couldn't do anything other than plan for when it came back up and we were doing that for the control groups."</i>

**13. Integration; Role Expansion; Set Tone**

<b>Coding and Source</b>	<b>Quote</b>
CI; C; X1; X2(2) Case 7 I/V 1 (R18)	<i>"We had lots of problems with test data... we had a daily meeting with the testing team, 'Right, you know, you've got 15 tests to do, how many did you do yesterday?' 'We did one.' 'Why's that, then?' 'Well, it just took ages to do the one test.' So, for some reason I got involved in testing because, you know, we were struggling so much. I said, 'Look, I'll stop doing what I'm doing, I am going to go off and test for a week.' And it hit me straightaway what was wrong, there was no bloody test data... And I could see all the problems when I was doing it, I</i>

	<i>was saying, 'My God,' because it drove me up the wall. I said, look, you know, after four hours I said, 'Right, I can't do any more of this. I'm going to stop.' And all I did was had a word with [R22] in the batch room and I said, 'I want a list of customers that meet all these criteria', which she gave me. And then I spent a day setting up loans that met all this criteria, on Wednesday morning rattled through the tests."</i>
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#### 14. Integration; Set Tone

<b>Coding and Source</b>	<b>Quote</b>
PC; SC; X2 Case 2 I/V 1 (R4)	<i>"It's a good team, it doesn't naturally drive itself. Once you've got them together they all work with each other but you have to enforce that relationship. So they will look for one person to take the lead and are quite happy for him to knock himself out doing it but they won't step in and help out. I mentioned the releases, they are quite complex, we have 25 different sites to do monthly, a lot of work that we have to do, but they are happy to let that happen with 2 or 3 individuals. As soon as I realised that, I said 'we are not having this, we need a team effort'. So they take 2 or 3 each... there's a reluctance to naturally help each other out. It's something that has to be – we are not doing this anymore, if you don't agree to it I'll just create a rota... I'm definitely an outsider, I do things completely differently."</i>
C(2); X1; X2(4) Case 3 I/V 3 (R9)	<i>"Yes I think that it would be better of course if you could get a solid road map pipeline but I think that now that when I started this account, previously I dealt with customers like large [bank], so those customers – it is a day nursery, at the end of the day, they used to plan for one year ahead or something like that, but now I understand the [telecoms] business very well and I understand sometimes it is very difficult to plan ahead for one year... it all depends on what the company does and the overall telecom markets tell us and that changes every time... so whenever this type of project comes we have to clear our desk and all the technical people, project managers, we meet together and have a good session to understand the requirement, so [the other] morning we got together booked one room and throughout the day we discussed and clarified, I think that is very important, that worked very well, so that everyone from our team and stakeholders were very much engaged."</i>
HC(2); PC; X1 Case 6 I/V 3 (R17)	<i>"[R15] would have been instrumental in pulling together the schedule, the resources and the cost model and I would have been pulling the final impact assessment would have gone back to the client together, the reason we introduced a project manager at that stage is it makes them familiar with the product particularly if he's going to be delivering that product as well, so we don't just throw it over the wall to him and everything is brand new, [he] actually has input into the requirements into the resourcing, into the solution and manages it from there on."</i>

**15. Integration; Point Ambidexterity**

<b>Coding and Source</b>	<b>Quote</b>
PC; X1 Case 3 I/V 1 (R7)	<i>"I think from my perspective I feel like I operate pretty much independently so I'll get a piece of work in, I'll quote for it, officially there's a quote production team that everything goes through, I've never used it, I've been told off about it several times... personally for me it's absolutely fundamental that what I say I'm going to deliver has been what I've drawn up, so I want to make sure I've got full control over that, so from that point it gets internally reviewed and other than these weekly meetings wherever I've got any issues I might raise them or perhaps someone like [manager] to say we need to start a risk on this, it's ok to proceed and the odd email saying we've just delivered this, it's pretty much an isolated experience so I'll work downwards with my team and across [customer], there's not really very much upwards."</i>
HC; SC Case 5 I/V 2 (R14)	<i>"Since becoming Team Lead, because everything goes through me, and one challenge for me is making sure the whole team gets that kind of viewpoint which I've got to really work on."</i>

**16. Integration; Point Ambidexterity; Role Expansion**

<b>Coding and Source</b>	<b>Quote</b>
CI; X1; SC Case 1 I/V 2 (R2)	<i>"It was me. It was me going back to [bank] again, tearing my hair out with the interactions of [bank], I had spotted, for weeks I said, 'You are in danger of losing some calls', but when my email changed to – 'You have lost some calls' – all hell broke loose. The satisfaction was there that we had tried to prevent it and we did get to the bottom of it as well... It was weird because [bank] and [Company], we've got on very well but we were ganging up on [supplier] who were looking after the storage network... because that was part of the relationship, [we] had to lead in supporting this particular solution."</i>

**17. Point Ambidexterity; Role Expansion**

<b>Coding and Source</b>	<b>Quote</b>
CI; HC(3); PC Case 7 I/V 1 (R18)	<i>"It was actually really frustrating at the time... he said, 'My God they only did two tests yesterday. You know, three testers, they've only done two tests.' 'Why?' 'I'm not really sure, but they're not doing them quick enough.' And of course when you actually do the testing, it is sometimes the best way to do it... in 40 minutes I realised straightaway because I think the tester was getting really fed up of me because I was shouting, 'God, it's failed again, you know, I can't do this and that.' I said to them, 'How the hell have you lived... you know, how have you worked like this for the last 18 months?'... I think, God, you know, you can't do it that way if you want to deliver something in a really quick timescale."</i>